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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITORIAL NOTES.

Precedents and Protection.

READING the report of the National Gas Council on the work of the past year, and the address of the President (Mr. D. Milne Watson) at the annual meeting, many striking features are found. But there are two to which we wish specially to direct attention, and which have an affinity. One of them finds indirect expression in every part of the report, as well as in the enlightening and cogent address of the President, and the second is contained only in the address. The first point is that the work of the Council is largely of a defensive nature, and only on few occasions do they take the offensive—such as in the case of railway rates when the time arrives at which the opinion prevails that there can be just claim that the industry is entitled to some concession. The fact, however, that so much of the work is defensive in character is testimony to the expanding interests of the gas industry, as well as the extent to which those interests come in contact with those of other industries or public authorities, or their interests or activities have a bearing upon or assail those of the gas industry. There is room for marvel over this as the report is read—a report distinctly exemplifying the watchfulness, the acuity of vision, and the comprehensive observation that must be maintained upon not only the operations of the industry, but the movements of many other people. That the Central Executive Board of the Council and the permanent officials have those qualities, and the capacity for close scrutiny and detection, cannot be gainsaid. How carefully the work is done is reflected, without set intention, in the reported proceedings in later columns; and this work is done for the whole gas industry, although there is some 13 p.ct.—and only that—of the total gas made in the United Kingdom which does not subscribe to the funds necessary for work from which they benefit in common with the subscribing undertakings responsible for the 87 p.ct.

Just as the Council operate wisely and well for gas undertakings of the country as a whole, so those undertakings individually should work with the Council in the general interests. The administrators of each undertaking should remember that there is a responsibility upon them to do nothing which will be inimical to the interests of all the other constituent undertakings of the industry. Membership of the National Gas Council should alone create the idea and spirit of oneness in matters of general policy—not purely managerial policy. The work of the Council has, through its effectiveness, inspired a large amount of confidence as to the general interests being well looked after; but following the idea of community of interests, if no undertaking would depart from commonly accepted and approved regulation without consulting the Council, the work of the latter would be much eased and the general interests of the industry would be served. We say this because there is a proneness on the part of some gas administrators when promoting Bills or Orders to enter into agreement with their adversaries quickly, in order to escape a present inconvenience, without taking the long view and considering the ultimate effects both to themselves and to the industry. Perhaps to them it may appear at the time to be only some small thing; but it is these small things—these molecules of new obligation or regulation—that oftentimes form the nucleus of a growth in precedent that may be irksome or disastrous for the whole industry.

It was in respect of such departures, large or small, that the President of the Council presents the second point to which reference is made in our opening paragraph. He emphasized very earnestly the importance of members refraining from inserting any new clause in Special Orders (the same would apply to Bills) without first consulting the Council. We think this plea will not fall on deaf ears. The Council is a co-operative body, and every constituent undertaking in the membership is consequently pledged to the principle of co-operation. It must be borne in mind, too, that the Council have now had a long existence, have made survey of all that affects the main parts of the industry, have had to penetrate the nooks and crannies in the industry's political structure, and have had to defend its interests in countless matters and ways. The accumulated experience, the trained knowledge, and the varied resources of the organization, invest it with a competence in all questions affecting rule and regulation which few undertakings in individual state can possibly possess. Through the aggregate of knowledge and experience, there is a better chance of danger being detected (if it actually exists) in any proposed new departure than possibly would be the case with an undertaking acting independently. Therefore, the President stresses the importance of precedents not being allowed to creep into Special Orders which might one day react to the detriment of other gas undertakings, and, indeed, of the industry as a whole. It is far better, before assenting to the inclusion of anything that is a new departure, to obtain the best possible opinion upon it. There are, as the President says, many cases to-day in which undertakings are regretting that, for one reason or another, they were compelled in the past to agree to clauses, the consequences of which are oppressing them at the present time. Pertinent instances are some of the protective clauses conceded to county councils in connection with the laying or repairing of pipes under main roads and on bridges. That is only one direction in which unluckily insidious powers and obligations have been agreed to through short-sightedness or a desire to obtain an immediate relief from opposition. This need not be if only counsel be taken with the central authority. There is a duty on undertakings—a duty both to themselves and to the industry at large—not to be parties to legislative innovation without obtaining the best assurance that all is well. We hope past experience will act as a present and future warning, and that the spirit of co-operation will prevail in this matter as in others. That is the desire of the President and the Central Executive Board, whose work is not lightened by being faced with unpleasant ill-working precedents, which do not, as a rule, remain with sole applicability to the originating undertaking.

The Council would much rather advise than that they and gas undertakings should be hampered by innovation assented to by a single concern. There is sufficient work for them in this connection in resisting attempts to impose unnecessary and unjust conditions on gas undertakings through the legislative promotions of Government Departments, county and local councils, electrical authorities, and railway companies. In rules or regulations precedents of a pernicious order would be prolifically created were it not for the strong front and stand taken—sometimes in company with other interested organizations—by the Council. The President, for instance, spoke very emphatically against legislation by departmental regulation or by-laws, which, if they became operative as drafted, would often hamper and harass not only gas undertakings but other enterprises. There are, for example, the model by-laws and regulations for the prevention of the contamination, waste, and misuse of water. Had the specification as originally drafted been allowed to go through without amendment, it would unquestionably have arrested the development of water-heating

by gas appliances along lines which experience has abundantly proved to be both safe and efficient. The Council have also succeeded in securing the inclusion of gas-works among "exempted buildings" in the model building by-laws. There are, further, the proposals of the London County Council for revising the existing position of matters in relation to the payment for changing the route or situation of pipes in the event of a diversion of main roads. They want the cost to be paid by gas undertakings instead of being an item in the cost of making the diversion. The action of the National Council, in association with other organizations, is likely to have a salutary effect in this particular. Then, again, inimical proposals by railway companies have been resisted, and there have been beneficial results. All these things are related in the report of the proceedings at the annual meeting of the Council. But they all bear upon the question of the creation of precedents or the introduction of legislation which assails rights and imposes onerous and noxious obligation.

These matters, however, constitute only one part of the Council's unceasing labours. The phases of the work of the year are widely varied and important. They affect all undertakings—large and small alike. They advance the interests of the industry; they resist much that is reactionary and obstructive, and even destructive of its interests. In other respects, too, the commonweal of the industry has been served. Every penny spent co-operatively in this way is a good and indispensable investment.

The First World Power Conference.

THE "first" in the above title denotes genesis; and the beginning of anything which has an eventual large influence upon the world's affairs is something which will become historic. We truly believe that this First World Power Conference at Wembley will have a large place in the world's economic history—at any rate, that is our profound hope. The conference has been spread over a fortnight; it has been attended by representatives of fuel users, power suppliers, and fuel savants and students from all parts of the civilized world. It has been a remarkable assembly. Combining the different sections, no less than 430 papers have been read, and, adding the discussions, a mass of material has been produced which we defy any man properly to digest who has daily duties claiming a large monopoly of his time. What is wanted now is that some attempt should be made to co-ordinate thought and view, and to extract from the mass the practical essence of it all in a readily digested form. Then we should realize the maximum effect from what looks like a successful maximum and initial effort at producing material. However, this is only the beginning of an international work in promoting economy and efficiency in the utilization of the world's fuel and power resources. Though only the beginning, it will have, as already said, a great influence, because through it there is evidence that men's thoughts and ideas have been so whetted that there is a strong desire for more; and the opinion has been registered by resolution that, by present organization in each country, international conference on fuel and power subjects should become a periodical institution, in turn in different countries.

Of course, it is somewhat difficult to separate in the consideration of fuel and power the questions of application of the generated agents, whatever the character of the fluid or substance produced. But if there had been a little more concentration at this initial conference on the utilization of fuels for the purpose of generating the various forms of power or heat energy, we think the result would have been of greater practical value. It is at the base where heavy fuel use proceeds that an incalculable waste takes place; it is there that co-ordination of utilization is more necessary than at any other place in our system of power or heat energy production, in order to realize the acme of over-all efficiency and economy. At the same time, a co-ordination of fuel use is wanted which will give us the highest aggregate in efficiency and economy without adversely affecting present efficiency and economy in any one industry or application. This is a large subject. It is difficult to get men to see that this is the real objective. The consequence is that they individually map-out routes in which self-interest predominates without regard to the world's work in general; and so the efforts of the more broad-minded are stunted and stultified. But a start has been made. The seeds have been sown. The appreciation of what is desired and is essential will grow. We cannot expect revolutionary work of this character to take the form and effects of a sudden conversion from what is wrong to what is right. Nor must we confuse the achievements of one country with the possibilities in another. It is all very well to talk of the performances of electricity in domestic application with water-power generated energy and subsidized supply; but that will not apply in this country, where for the bulk of electrical service steam must be generated or the internal combustion engine be used. We must avoid in the study of the problems of co-ordination incompatibles of this kind. As the work of international conference proceeds, there is no doubt we shall get down to a proper basis, and deal with the matter systematically from the fundamental stage. As an inceptive conference, it would, as previously said, have been preferable to confine consideration to fundamentals rather than make excursions into numerous applications, in which the energy used may not be developed in the ways which tend to the maximum efficiency in use, and therefore economy, of our reserves of those native materials which are the sources of the bulk of our energy.

In the "JOURNAL" last week, a commencement was made of the publication of the main parts of the papers read before the Gas and Fuel Section of the conference. We then dealt with the communications by Mr. W. Gordon Adam on the "Liquid Bye-Products of Coal Carbonization as Sources of Power" [p. 254] and Mr. E. W. L. Nicol on "Coke as a Fuel for Steam-Raising" [p. 255]. Some of the papers were previously introduced for consideration in the section devoted to the Preparation of Fuels; and points from the discussions which then took place were published. A report was also given [p. 252] of the speeches at the luncheon in connection with the Gas and Fuel Section, at which Mr. D. Milne Watson presided. To-day we continue the publication of the principal parts of the papers and discussions before the last-named section, and shall continue them until the material is exhausted. The papers published to-day are those by Dr. J. S. G. Thomas and Mr. D. Chandler, of the South Metropolitan Gas Company, on "Illumination by Gas," and by Sir Arthur Duckham, K.C.B., on "The Use of Town Gas in Industry."

Back to Nature in the Matter of Light.

"'BACK to the land' was the insistent cry a few years ago; 'Back to Nature' in the matter of light should be equally insistent to-day." These were among the striking phrases in the opening part of the paper by Dr. Thomas and Mr. Chandler on "Illumination by Gas;" and we advise those gas men who are not doing all they ought to do to preserve their lighting load carefully to read that paper, as we are confident it will prove a good tonic, and a stimulant to new effort. It is a strange thing how some men are influenced into a state of apathy by the successes of others, instead of being stimulated to ascertain whether there are not ways and means by which they themselves can do better. Fortunately, gas lighting possesses intrinsic merits which, if application is right, must have, and are having, a large effect in the matter of competition. There are to-day pronounced evidences of appreciation of this in the gas industry; and we hope to see this grow in the interests of the industry, of those who improve and manufacture the means of use, and, last but really foremost, of the community generally. All are concerned. Gas is one of Nature's own economical means of providing illumination—economical in the expenditure of substance to produce it, innocuous in its effects upon vision and health, and economical in respect of the pocket. The main proof of all this lies in the efficiency of the appliances by which gas is consumed, and not only for lighting but other purposes. The largest assurance that the industry has in the matter of protecting and recovering business is in seeing that its primary commodity is efficiently used. Both Dr. Thomas and Mr. Chandler have been trained in the "Metro" school, where the doctrine of efficiency in use takes first place among the essential fundamentals of progress. Every successful piece of gas lighting is an advertisement, and helps to strengthen the barrier to competition.

In this matter of lighting, the therm as a basis of comparison is exceedingly valuable. The price of a gaseous therm is getting nearer and nearer to the price per KW.-hour of electricity for lighting purposes. The heaviest difference for electricity to encounter is that the gas therm will pro-

duce by low-pressure inverted burners two-and-a-half times more candle-hours than a therm of electricity used in the 0·7 watt (the gasfilled, and miscalled half-watt) lamp. The gas therm will yield by low-pressure lighting 3600 candle-hours, and by high-pressure lighting 10,800 candle-hours. The unit of electricity will, using the gasfilled lamp, yield 1428 candle-hours. If these facts are established in mind, the competition from the side of gas will become even more severe. Electricity for lighting has made its progress largely on the ignorance of householders and shop and factory owners, supplemented by the indifference to the merits of gas lighting by the suppliers, who ought to have been the first to utilize them as factors in competition, but did not. A growing tendency to-day is to have more light, especially in factories. This tendency provides an opportunity which should not be missed. If with lower standards of illumination there is economy with gas, then that economy will be multiplied with the raising of the standard. The expenses of installation for higher standards of illumination can be effected more cheaply than with electricity; and therefore, as shown in the paper, the cost of the improved standard of illumination will be more quickly recovered with gas than with electricity through improved working efficiency of the operatives. There is another point. The increased efficiency of electric lamps—measured in naked form—has only been obtained by augmenting the intrinsic brilliancy of the lamps; and this is totally opposed to natural conditions, and so is detrimental to the organs of vision. To counteract this, methods have to be adopted which reduce the useful or effective duty of the lamp; and therefore naked efficiency is considerably discounted, and so is the monetary economy which the additional efficiency is supposed to effect. The paper deals with these matters and others which bear upon the use of the heating energy of gas for the production of illumination—such as hygiene and the blackening of ceilings, about which there still exists an extraordinary lack of knowledge. All these features of the subject are worth individual study, for they represent factors of which hitherto insufficient use has been made in the gas industry.

Town Gas in Industry.

ONE of the mistaken notions, largely fostered by the electricity industry with the view of obtaining more favourable conditions for itself, is that power in industry is far and away the predominant factor. So sedulously has this idea been promulgated, that it has taken hold of our politicians, and electricity is regarded by them—by leaders as well as by the rank-and-file—as the one thing needful for the promotion of the fortunes of industry. As a matter of fact, the requirement of heat is universal in industry, and its provision in an easily handled and economical form—a form promoting works efficiency and economy—is as highly important as power. When the agent used for heating purposes can be the same as that employed for power, so much the better; and for a large range of purposes gas can efficiently perform the dual duty. Equally important to the efficient and economical provision of the agent is its application. To these and other phases of the question, Sir Arthur Duckham referred in a paper on "The Use of Town Gas in Industry." Coal is our greatest national asset. It will in the immediate centuries keep its place; but if coal was mentally equipped and capable of appreciating, it would feel very small and inferior when it saw the catalogue of its disadvantages to industry (which Sir Arthur Duckham supplied in his paper) when carried and distributed to, and handled in, innumerable factories, together with the inefficiency of combustion owing to its varying chemical and physical properties, and the several conditions of use which cannot be controlled to suit any and every circumstance. Then its combustion pollutes the atmosphere, with many attendant troubles. Examination of the conditions leads to the fact that uneconomies, inefficiencies, and all the attendant troubles of coal use can be eradicated by the application of gas as a fuel—a fuel which requires no storage in the factories, no mechanical or manual handling, and which can be controlled in application for the provision of the necessary temperatures, within small space or over large surfaces.

As to cost, this is not merely a question of fuel, but into the comparative calculation must come all the debits and credits from capital onwards, and one of the credits to gas must also be the increased efficiency which enables additional output and equality of product through the constancy achievable in treatment. Sir Arthur gave an estimate as to the relative costs of coal and gas; but all such computations should be based on a given set of conditions in order to get a true comparison, and the costs must include all differences between coal and gas delivery to the provision of the heat at the point of utilization. But this would have meant an extension of the paper to inordinate length; and so we must take on trust, relying upon the author's known competence in these matters, his estimates of what it would pay industries to spend per therm for gas in comparison with the therm delivered in the form of raw coal. Taking the cost of coal delivered at 35s. per ton, or 1·45d. per therm, and gas at 4·4d. per therm sold in large quantities; then taking into account the fact that the efficiency in use for many furnace purposes is only 25 p.ct. for coal and 70 p.ct. for gas, a comparative fuel cost is obtained of 5·8d. for coal and 6·28d. for gas. The difference is quickly wiped-out and profit added by the efficiencies and economies which result from the use of gas, with the result that it is estimated by the author that in some industries it would pay to use gas costing per therm ten to twenty times the coal therm; in another class of industries, five to ten times the cost of a coal therm could be paid for the gas therm; and in still another class, three to six times. The managers of industries are beginning to realize that there are, in using gas for heating, direct and collateral advantages which represent money. But the appreciation of this is a slow growth; and there is still a prevalent tendency to make comparison on the fuel cost alone. To alter this, educational work is a constant necessity. At the same time, the largest extension of the industrial business will obtain where the price of gas is a special rate for large consumption. As is pointed out in the paper, in America gas is far dearer than in this country; but there labour conditions have forced to the front the economical benefits of gas in industrial heating operations. Consequently, gas is used for the major part of such heating processes, even at 1s. and more per therm. That speaks volumes.

Towards the end of the paper, Sir Arthur turns to a subject to which he has frequently referred. When, through the Government, during the war, an inquiry was held with the view of co-ordinating power supply, the mistake was made of limiting it largely to electricity provision. That mistake has been realized by many, but not rectified by the only power who could command such an inquiry, and give adequate effect to the findings. In the author's opinion—and there is large agreement with him, as the holding of this World Power Conference alone signifies—a Commission for Heat, Light, and Power should have been instituted for the purpose of examining and organizing the conservation of our fuel resources, and advise as to the best steps to be taken for the benefit of industry from all points of view. Such a Commission could help to the fruition of schemes for the linking-up of existing supplies, the saving of waste, the reduction of stand-by plants, and the lowering of overhead charges. One of the most fruitful studies for the reduction of manufacturing costs is the co-ordination of electricity and gas supplies. Three ways which might be followed are described in the paper; but with the second one we are not altogether in sympathy. The production of gas, coke, and other secondary products, is work for specialists, if the highest efficiency and economy are to be obtained; and that work, it is better, should not be a prefix to that of generating electricity. All that electricity wants is a fuel which can be economically applied and efficiently used for generation purposes. It does not desire to be saddled with anything else. In our opinion it is better, too, in all possible cases for primary products to be made in close proximity to the seats of use, as long transmission costs and losses would in many cases nullify the other advantages of the business interrelations of the two industries. However, there is large scope here for that study which it was one of the objects of the World Power Conference to promote.

Next Year's Wembley.

There is no intention of abandoning the fine buildings and general lay-out of the British Empire Exhibition at its close in October. There has been a great deal of discussion behind the scenes as to what should be done with them next year. The suggestion has been made that the exhibition should be continued next year; and at a luncheon last Monday, the Prince of Wales "backed up" the idea. He stated that he has been to Wembley six times, but does not seem to be making much headway in seeing all its wonderful sights.

Special Order Procedure.

It appears from the minutes of the Central Executive Board of the National Gas Council that the Select Committee appointed by the House of Lords to consider the question of procedure in connection with the granting of powers by Special Orders have decided not to receive oral evidence, but they are willing to have from the Council a written memorandum for consideration. A memorandum has therefore been prepared, and submitted to the Select Committee. It sets forth in detail the arguments in favour of retention of the present procedure under section 10 of the Gas Regulation Act. If simplicity is displaced by restoring the complexity of the old system—and perhaps worse—and expense is increased, then small and non statutory undertakings will decline to apply for statutory powers, and the affairs of other more important concerns will come under less frequent review by the authorities. The sittings of the Committee are being held privately; but their report is not likely to be long delayed.

A Threatened Fight.

Despite all the efforts to arrive at a satisfactorily mutual decision with the railway companies over the mains-of-insufficient-capacity clause, the Central Executive Board of the National Gas Council apparently find the claims of the companies so irrational that an agreement cannot be reached. The railway companies have come to the conclusion that no good purpose will be served by continuing the negotiations. This being the case, there is no alternative but to contest the clause in Parliament upon the first opportunity.

Company Promoters at Work.

Gas shareholders have during the past week been flooded with prospectuses offering for sale by tender 3000 10 p.ct. preference shares of £1 each at a minimum price of £1 15s. per share and 10,000 7 p.ct. ordinary £1 shares at the minimum price of £1 each, in the Heathfield and Waldron Gas Light and Coke Company, Ltd. The prospectus is one of the most foolish we have seen. That it has been well circulated is shown by the fact that correspondents in several parts of the country have sent copies, in order to inform us of the resurrection in the gas field of a form of company promotion and capital raising respecting which we have never hesitated to say what we think. Copies of the prospectus have reached the editor in his private capacity as a shareholder in gas companies; so that there is no question as to the wide circulation of the document, against which we hope all readers will warn gas shareholders as extensively as possible, if only on the ground that so much capital is asked for, and so few facts are disclosed. The prospectus states that the Company have been established about thirteen years, and obtained an Order in 1915 confirmed by Parliament, authorizing a supply of gas. Since then there has been a "considerable increase" in the sale of gas and coke. The money it is now sought to raise is, we read, to be devoted to extensions; and it is estimated that this will increase the sales by 3 million c.ft. No information is given as to the present actual sales. It is said that the quantity of gas, coke, and residuals sold shows a steady annual advance. The increase of revenue for the whole of the year 1923 over that of 1922 amounted to 25 p.ct. No figures are published as to what this percentage means. The increase of revenue for the quarter ended March, 1924, compared with the same period of 1923, was equal to 12 p.ct., since when the number of consumers has been enlarged, and is still increasing. No figures are supplied as to what these statements actually represent.

A Few Questions for the Directors.

We ask the promoters to let us know definitely the amount of gas sold last year, because one correspondent who thinks this is "another of the famous issues," says he believes the Company "sell about 5½ million c.ft.of gas a year, and make about 6 millions." We cannot vouch for the accuracy of these figures; and the ordinary sources of information seem to have overlooked the Company in the compilation of statistics. Let us assume the figures are approximately true. We see that the capital is £15,000, of which £5000 is the original, issued and paid up, and £10,000 the authorized additional capital now offered. It is further assumed —and we ask the promoters if this is correct—that the £3000 preference shares offered are part of the £5000, because it is stated that it is offered for sale "by order of the holders." The "holders" must be either very foolish or have no faith in the Company to wish to sell a 10 p.ct. preference share. Would the Directors have any objection to informing us whether they are the "holders," or persons outside the administrative body? The assumption that this £3000 is part of the £5000 "issued and paid up" is based upon the fact that the Company's capital is £15,000; and the £5000 issued, with £3000 preference, and £10,000 ordinary shares would make £18,000—£3000 more than the total capital. Let us further assume that the £10,000 will be obtained (we sincerely hope it will not be); with the £5000 issued, it would make £15,000. If the sale is only about 5½ millions, a capital of £15,000 would be equal to £2726 per million cubic feet. If the sale increased to 7 million c.ft. the capital would be equal to £2143 per million! It is because this is so outrageously funny, if our correspondent is correct, that we ask the promoters to give us for publication the actual sales for the year 1923, and to supply information which they have withheld from a prospectus which manifestly trusts to credulous people supplying the capital asked for.

The Board and Others.

We shall be pleased if, when—we repeat "when"—the Board reply to the questions already asked, they will tell us whether it is true that the name of Eaton is identified directly or indirectly with the Electric Light and Power Finance Corporation, Ltd. There have lately been electric supply prospectuses issued; and these have been criticized in our columns. The Corporation just mentioned have received a little attention, so have the Wareham Electric Supply Company, Ltd.; and the Warwickshire and South Midland Electricity Supply Corporation, Ltd., have not been ignored. The Directors of the Heathfield Company are: Mr. E. B. Calvert, Mr. Walter H. Mann, Mr. Emerton C. Buik, and Mr. Edward Newman. The Solicitor is Mr. W. Thompson. Not one of these men is recognized as having technical knowledge of the gas industry. A Mr. E. B. Calvert, a Mr. W. Thompson, a Mr. W. H. Mann, and a Mr. Emerton C. Buik are Directors of that wonderfully named Company the Warwickshire and South Midland Electricity Supply Corporation. Mr. Emerton C. Buik is one of the Directors of the Wareham Electric Supply Company, Ltd., and Mr. Thompson is the Solicitor. Mr. Walter H. Mann and Mr. Emerton Claude Buik are Directors of the Electric Light and Power "Contracts" Corporation, Ltd. The names of Eaton and of Sir Charles B. H. Soame, Bart., are not to be found on the prospectus of the Heathfield and Waldron Gas Company. What a pity! Gas shareholders know their names well.

A New Triple Alliance Mooted.

The Miners' Federation at their Annual Conference last week discussed a proposal for a new triple alliance with the railway and transport workers on lines similar to, or broader than, the alliance which collapsed in 1921, when the miners engaged in a three months' struggle for a national wage pool. However, a motion dealing with the matter was withdrawn, on the understanding that it would be considered by the Executive, and be discussed at the Trades Union Congress.

Railway Nationalization.

The National Union of Railwaymen, at their Annual Conference, discussed the question of the national ownership of railways and workers' control. A resolution (which was passed) welcomed the grouping of the railway companies as a step in the right direction, and called upon the Executive of the Union to frame a Bill to be submitted to Parliament, having for its object the nationalization and democratic control of the railways of the country. The socialistic and communistic programme is developing; but it is a far cry from talk to consummation.

The Miners' Demands.

The Miners' Federation Conference at Swansea last week was the scene of much discussion, and the passing of several resolutions. The demand for the nationalization of the mines and of minerals was reaffirmed. With perfect unanimity claims were made for a six-hour working day and a five-day working week. The mine workers intend having some easy and comfortable times, and obliging the country by doing the minimum amount of work for the maximum pay. The Executive were also instructed to press the employers for membership of the Federation by all workers as a condition precedent to employment.

PERSONAL.

Mr. G. W. FLIGG, on retiring from the position of Gas Manager to the Dewsbury Corporation, has been presented with a smokers' cabinet, the gift ot the works employees.

Mr. STANLEY E. LOGSDON, Gas Engineer to the Pernambuco Tramways and Power Company, Ltd., of Pernambuco, Brazil, arrived in England on the 6th inst., en route for Norway, where he will enjoy a restful holiday with his wife and family. Before returning to Pernambuco, Mr. Logsdon will in October next spend some time in England in order to obtain the best information as to the latest improvements in gas plant, appliances, and apparatus, and friends interested may communicate with him at No. 15, Little James Street, London, W.C.1.

Messrs. Alder and Mackay, Ltd., gas-meter manufacturers, have appointed Mr. GEORGE CRUICKSHANK, from the head office, to be Manager of their Alfred Street Works, Belfast.

Mr. JOHN CAINE, Secretary to the Dalton-in-Furness Gas Committee, has tendered his resignation, owing to continued ill-health. Being still unable to carry out his duties after twelve months' leave of absence, he stated that he could not conscientiously retain the post. The Gas Committee have postponed consideration of the matter to a later date.

Mr. THOMAS F. BOWER, son of Mr. W. Ackroyd Bower, of Messrs. Thomas Ness, Ltd., Darlington, whose family for many years have been intimately connected with the gas industry, has been awarded the degree of B.Sc., 1st Class, at Manchester University.

OBITUARY.

JAMES WHIMSTER.

The Institution Number of the "JOURNAL" contained the sorrowful news of the death at Bridge of Allan, on June 26, of a very old and greatly esteemed friend, Mr. James Whimster, of Armagh. Mr. Whimster, who was 76 years of age at the time of his death, was a son of the late Mr. Thomas Whimster, who was Manager of the Perth Gas-Works for many years.

Deceased received his engineering training in the Railway Engineering Works, Perth, and afterwards served under the late Mr. William Foulis, of Glasgow, having charge of the Chemical Works at Dawsholm. He was appointed Engineer and Manager of the Armagh Gas-Works in 1883, undertaking later the additional duties of Secretary. Since 1918, when he relinquished his responsible position at Armagh, he had lived in retirement at Bridge of Allan. During the whole of the many years he spent in Ireland, he remained one of the most respected members of his profession there, and in the public and social life of Armagh (where he was buried) he always took an active interest. He was the founder of the North of Ireland Gas Managers' Association, which subsequently developed into the Irish Association of Gas Managers, and to this organization he acted for a long time as Hon. Secretary and Treasurer, retiring (as a presentation address set forth) "after twenty-two years of faithful and loyal service to its every interest and that of its members." The position of President was also filled by him.

Mr. Whimster's wife pre-deceased him in 1916, but he leaves two sons—Mr. James Pirrie Whimster, gas-coal contractor, of Glasgow, and Mr. John Wesley Whimster, Engineer and Manager to the Bath Gas Company—and to them our keenest sympathy is extended.

There is general sorrow among the gas managers of Ireland over the tragic death of Mr. P. B. ELLACOTT, Manager of the Waterford Gas-Works, who was drowned while bathing at Rivertown, Tramore Bay, on Monday evening last week. Mr. Ellacott cycled out from Waterford against a high head wind, and while overheated entered the water. He was noticed by some spectators to be in difficulties, but before help reached him had disappeared. The body was subsequently washed ashore. Life was not extinct, but all efforts at resuscitation proved ineffectual. Mr. Ellacott went to Waterford from Newry, where he had held the position of Manager at the gas-works from August, 1913, until November, 1921. A keen swimmer, he also took an interest in many other forms of sport. He was a native of Exeter.

The Articles of the Institution of Gas Engineers.—There is to be a special meeting of the Institution of Gas Engineers at No. 28, Grosvenor Gardens, S.W., at 5 o'clock next Wednesday (July 23), for the purpose of submitting for confirmation the resolutions relating to alterations to the Articles which were passed at the recent annual meeting.

The Institution of Chemical Engineers.—At a Council Meeting of the Institution of Chemical Engineers, the following were elected as Corporate Members. Members: Messrs. C. Davidson (Alexander Cross & Sons, Ltd.) and H. M. Ridge (Ridge Roasting Furnace and Engineering Company). Associate Members: Messrs. H. J. Hailstone (Rochdale Corporation Gas-Works), W. C. Peck (Messrs. Burgoyne, Burbridges, & Co., Ltd.), H. W. Webb (Cardiff Technical College), and E. P. B. Wilson (Shanghai Municipal Council).

"IN MEMORIAM: KELVIN, 1824-1924."

These were the words used by the Rt. Hon. the Earl of Balfour, K.G.O.M., F.R.S., in introducing the toast of the immortal memory of Lord Kelvin, at the banquet held at the Connaught Rooms, Great Queen Street, on Friday last, over which he presided.

The occasion was an extremely notable one, from the circumstance that it had brought together the flower of Britain's nobility in the domain of Science and Engineering, together with their colleagues of the United States of America, Canada, Denmark, Spain, France, Italy, Poland, Mexico, Sweden, Norway, and other countries. There were present, for instance, Sir J. J. Thomson, O.M., D.Sc., F.R.S. (Master of Trinity); Sir F. W. Dyson, F.R.S. (Astronomer Royal); Col. R. E. Crompton, C.B.; Dr. Elihu Thomson (who the day previously had received the Kelvin Medal, one of the highest distinctions for bestowal in the world of science); the Rt. Hon. Lord Rayleigh, F.R.S.; Prof. Luigi Lombardi (Delegate, Real Academia Nazionale dei Lincei, Rome); Dr. A. E. Kennelly, Professor of Electrical Engineering (Harvard University and Massachusetts Inst. Technology, Past-President of the American Institute of Electrical Engineers); the Rt. Hon. Lord Chalmers, G.C.B. (Master of Peterhouse, Cambridge); Sir Richard T. Glazebrook, K.C.B., F.R.S. (Chairman of the Kelvin Centenary Committee); Sir John Snell (Chairman of the Electricity Commissioners); Dr. Alexander Russell, F.R.S. (President of the Institution of Electrical Engineers); Mr. J. Ferguson Bell, M.Inst.C.E. (President of the Institution of Gas Engineers); and Mr. W. H. Patchell, M.Inst.C.E. (President of the Institution of Mechanical Engineers).

The Earl of Balfour spoke most eloquently of Lord Kelvin's life and brilliant work for 52 years as Professor of Natural Philosophy at Glasgow University, to which he was appointed when only 22 years of age. After the toast had been honoured in silence, that of "Delegates to the Kelvin Centenary" was proposed by Sir Richard T. Glazebrook, and acknowledged by Dr. Elihu Thomson and Prof. Luigi Lombardi. The latter, from Rome, speaking in excellent English, referred to the beneficent results of the work of Kelvin. His inventions invariably had an immediate practical application whereby mankind as a whole was benefited. There were the examples of his discovery of the mirror galvanometer, the improvements in the mariner's compass, Atlantic cable laying, the discovery of the second law of thermo-dynamics, &c. "The Chairman," proposed by Dr. A. E. Kennelly, was accorded musical honours, and Lord Balfour briefly expressed his acknowledgments.

The banquet was most enjoyable, and highly successful in every way. It afforded the opportunity for the renewal of many old acquaintances and the formation of new ones. A selection of music was performed during the evening by the band of the Royal Regiment of Artillery, under the baton of Lieut. E. C. Stretton, M.V.O., Director of Music, R.A.

A word of congratulation is due to Mr. D. N. Dunlop for the excellent manner in which he organized all the arrangements for the Kelvin Centenary celebrations, and for the splendid way in which they all were carried out.

Institution of Public Lighting Engineers and Superintendents.—The Corporation of the City of Edinburgh have kindly decided to welcome the members of the Institution to Edinburgh, and to entertain them to luncheon in the City Hall on the occasion of their visit there on Thursday, Sept. 18, and to arrange for a drive to inspect the various methods of public lighting in that city.

An Illuminating Engineering Society for Austria.—The inaugural meeting of the newly-formed Illuminating Engineering Society in Austria took place on April 8 in the Lecture Theatre of the Technische Hochschule, Vienna. At the present time, therefore, says "Illuminating Engineering," there are in existence Illuminating Engineering Societies in England, the United States, Japan, Germany, and Austria.

Cyanogen Compound Manufacture in Holland.—The manufacture of ferrocyanides, prussian blue, bronze blue, and similar products from gas-works residues is, says the "Chemical Trades Journal," about to be undertaken by the N.V Chemische Verfstoffenfabriek voorheen L. Th. ten Hoorn, at their new works in Maastricht. The Company, which was formed in 1922 with a capital of 60,000 guilders, will also trade in minerals, chemicals, and dyewares.

"Business Features of Wembley."—This is the title of a useful little handbook compiled by the "Investors' Chronicle" and authorized by the British Empire Exhibition. It reveals and explains the business side of Wembley, indicates the most interesting exhibits in the Palaces of Industry and Engineering, and deals fully with the Colonial Pavilions and the smaller buildings in the grounds. The business visitor is shown how he may utilize his time to the best advantage and without missing any essential features. The handbook, which is well indexed and printed on bank paper, may be obtained in interleaved form in order that the visitor may make his own personal notes. ["Business Features of Wembley," "Investors' Chronicle," No. 8, Drapers' Gardens, E.C. 2. Published by the Fleetway Press, Ltd. Price, 1s. post free; interleaved edition, 1s. 6d.]

ELECTRICITY SUPPLY MEMORANDA.

IN the "Memoranda" for June 25, reference was made to a Bill which has been introduced to extend the powers of the Electricity Supply Acts, 1882-1922, and which proposes to give to

Compulsion.

Joint Authorities compulsory purchase powers over generating stations and transmission lines. As was pointed out at the time, we imagine that such compulsory authorization will be very repugnant to a majority of the administrators of electricity undertakings, and that there will be a very active resistance to the proposals. The Bill has been issued. It appears that its object is to make the Acts of 1919 and 1922 more effective for the capital purpose of their existence. But there are grave doubts in large sections of the industry to-day whether that main purpose is in the best interests of the industry. In our opinion, the promoters of the Bill err in their fundamental assumption that the way of effectiveness lies through compulsion. Anyway, it is not diplomatic. By the Act of 1922, certain financial powers were conferred; but purchase of generating stations and transmission lines could only be by agreement. If in the judgment of a Joint Electricity Authority, the independent working of a generating station is opposed to the supply of cheap electricity, then they are to be empowered by the new measure to acquire it compulsorily with the consent of the Electricity Commissioners. In the event of such an application, those in possession of the station may appeal to the Commissioners; and if they can satisfy them that the station is not essential to the supply of cheap electricity in the area, it may be exempted from the operation of the Act. The proposals as to payment for expropriation are not such as will commend themselves. They are altogether too indefinite. Those who wish to acquire compulsorily may, in the case of an undertaking with more than one station, pick and choose which one they will take. There is to be a "standard price" in the case of property taken from a local authority in the form of annuities indemnifying the authority against its liabilities for interest and sinking fund charges on the capital borrowed, or a capital sum calculated as afterwards provided. In the event of the acceptance of the first alternative, the annuity "may be" increased in exceptional cases. If the Bill passes, there will no doubt be an attempt to prove that they are all exceptional cases.

Privately Owned Stations and Other Matters.

Then we come to privately owned stations or lines. In these cases, the standard price is to be a sum equal to the cost of the land, buildings, and plant, *plus* any expenses, but less depreciation. That, again, falls far short of what the proprietors of a statutory company would expect whose total capital has appreciated through the good management and prosperity of the concern as a whole. The owners of the capital will be strongly opposed, in such circumstances, to part of it being repaid to them, less depreciation of plant, and without any recognition of the accrued value of the capital. That is not what in law is called equity. Then, in addition, a sum may be awarded for damage caused by the severance of the station or transmission lines. In this case, the award is to be determined by an auditor appointed by the Commissioners, and provision is made for arbitration in the event of dispute. The question of damage is a very open one. The immediate damage may not be very great; the ultimate damage may be, and this it is impossible to assess, however good an arbitrator may be. We believe in the benefit to an industry of a large number of individual workers—in the electricity industry in their own generating stations. There is by concentration a great danger of the stereotyping of plant, and a drag being put upon improvement. If a generating station is left to develop with a keen engineer at the top, there is good chance of that concern increasing in efficiency to such an extent that the consumers may substantially benefit, and more so than by generating at a distance and transmitting through a great length of line. We admit that is as uncertain as the realization of the crude hypothesis of the advocates of extreme centralization. Nevertheless, it is easy to picture the potentialities of the individual and independent local station; and however excellent an arbitrator may be, he could not take possibilities into calculation, and measure their future materialization, so as to award the damage that might eventually be done to a particular locality through the severance from it of a generating station. It is seen, too, that expenses and depreciation are to be determined by rules which the Commissioners will lay before Parliament.

Price of the Current.

There is another vague matter. The Joint Authority are to be placed under an obligation to supply to the owners of any transferred station such a quantity of electricity as may be required up to the amount that could have been generated in that station, and at a price not greater than the cost at which it could have been produced there, and to pay the expenses of any changes in frequency or pressure. It is proposed to enact that improvements which have been under consideration six months before the notice to acquire are to be taken into account. A station may have the capacity for great progressive improvement in the matters of efficiency and output. In such a case, what interpretation is to be given to the words "could have been generated" in regard to either the amount or the cost? There is room there for infinite dispute. The clause appears to contemplate that it may be possible to generate at the local station at a lower price than at the larger power station, for the quantity of energy obtainable at the price is limited, and the undertaking beyond that amount will have to pay the higher price of the (in some cases) distantly generated and transmitted supply. It can hardly be the other way about; for if there is any economical advantage in concentrated generation, then it would be better for the local undertakings to receive energy to the amount of the capacity of the confiscated station at the normal price of service from the central power station. The Bill is illogical, vague, and unfairly dispossesses a locality (against the deliberate beliefs and decisions of the local administrators) of statutorily conferred rights. If it proceeds, there can be no question that it will have to meet a vast amount of legitimate hostility from within the electricity industry, in which confiscation is no doubt as unpleasantly regarded as it would be in the gas industry. Fortunately the gas industry is not looked upon by the present Government as so important as the electricity industry. Political circles only awaken, and with startling vigour, to its supreme importance when war is raging. That is not a matter that agitates us in the slightest. We care very little as to what politicians think of the gas industry; it is what the public think and do that is important. And the public patronage of the industry increases abundantly. The Bill upon which this comment is made is, in our opinion, only another deliberate step towards the nationalization of the electricity industry.

Neglect.

In the report of the Senior Electrical Inspector of Factories (Mr. G. Scott Ram), there is considerable testimony to faulty provision of electrical equipment, and to the ignoring of the greater risk that attends the change-over to the alternating current system. It must be remembered that the Inspector deals only with industrial supply. He bears witness to some of the new power stations being well designed, with protection details carefully thought out. But, unfortunately, even among the larger undertakings there are examples to the contrary; and there is unaccountable oversight or indifference to elementary provision for safety. Instances of this are given, and quotations are made from the Divisional Inspectors' reports, in which it is pointed out that the standard of observance of the regulations does not always advance at the same rate as the growth of the use of electricity. The neglect that is obvious from these statements is really appalling. Two or three of the inspectors call attention to the extension of the alternating current system by most of the supply undertakings. Though this makes it more imperative than ever that the requirements of the regulations should be observed, the strange thing is that many electricians do not appear to assess adequately the extra danger that is encountered, and they proceed as though dealing merely with direct current. Even the chief engineers of some supply undertakings are charged with overlooking the additional risks. This is bad showing, and an unhappy reflection for those who put their trust in the electrical profession to provide them with the safest forms of installation.

Fatalities.

During the past year, the number of reported electrical accidents in works and factories was 361, including 21 fatal cases, compared with 309 and 17 fatal cases in 1922. Three "dangerous occurrences" were also reported. While the number of accidents increased by 17 p.ct. over that of the previous year, it is interesting to note that the number of accidents was less than ten years ago, when there was a total of 472, with 19 fatal cases. The latter figure is not less. When one considers the enormous increase of electrical energy during the period, the result is described as "remarkable." But it must not be forgotten that we are dealing with industry only; and it is questionable whether in industry, with its slack time last year, there was an enormous increase in the consumption of electricity compared with ten years ago, when the workshops of the country were straining every nerve and machine to produce munitions of war. However, as usual, the larger number of accidents occurred on alternating current systems of low and medium pressure. There were ten of these where the pressure of the shock to earth was from 210 to 250 volts. Six of them were on lighting circuits. One fatality occurred with direct current at 220 volts; and, as usual in direct current cases, the circumstances were particularly favourable to a severe shock being received. This was a welding case. In eleven of the twenty-one fatalities, five were at the probable voltage of shock of 250, one at 210, one at 240, two at 230, one at 220, and one (direct current) at 220.

Artificial Respiration.

There is some interesting information regarding artificial respiration. In thirteen cases of electric shock, it is definitely recorded that the victims were rendered unconscious, and were brought round by artificial respiration. It is observed from a table that these cases included shock from both direct and alternating current, and over a wide range of pressure. In twelve of the cases, the victims were brought round in half-an-hour or less, but in one case after two hours. This latter proves the value of long-continued treatment. In the case of the fatal accidents

other than those where the victims died subsequently from burns, artificial respiration was carried on in one case for two hours, in five for over an hour, in six for half-an-hour or more, in one for twenty minutes, in one for two minutes, and in one case, in a public supply generating station of all places, it was not attempted at all. The electricity supply industry boasts of its scientifically trained men; some apparently want spurring to a complete appreciation of the realities and obligations of their position.

The Hackney Conversion.

How the Hackney Borough Council propose to make the financial side of the conversion of the street lighting from gas to electricity financially presentable is shown by a report of the Finance Committee of the London County Council upon an application for sanction to a loan of £32,118, which is a small part of the cost. The total estimate for the scheme is £177,118, of which £145,000, for distributing mains, is chargeable to the capital account of the electricity undertaking, and the balance, £32,118, for lamp services and lamp-post equipment, to the Borough Council's general fund. It seems that the Borough Council anticipate that 70 p.ct. of the work will rank for assistance from the Unemployment Grants Committee; and it is proposed to reduce the charge for current supplied for street lighting from 1·55d. to 1d. per unit. That is how it is hoped to make a net saving on the scheme to the general rates of £1121 a year for the first five years (assuming £1368 a year is received from the Unemployment Grants Committee), with an ultimate saving after 25 years of £2759. The Electricity Commissioners, who will deal with the £145,000, see no reason to doubt the financial success of the scheme from the standpoint of the electricity undertaking; but they say nothing as to success from the standpoints of the ratepayers—in respect of finance and efficiency. The Finance Committee of the County Council are obviously not impressed by the saving to be effected; for they say: "On the figures submitted, the estimated cost of street lighting by electricity instead of by gas shows that some saving will be effected; but this result is dependent upon the receipt of substantial assistance from the Unemployment Grants Committee, and to the present charge for current for street lighting being reduced by one-third." Their recommendation was that of the £32,118, the sum of £18,768 should be repaid within twenty-five years, and £13,350 within ten years, from the date of borrowing.

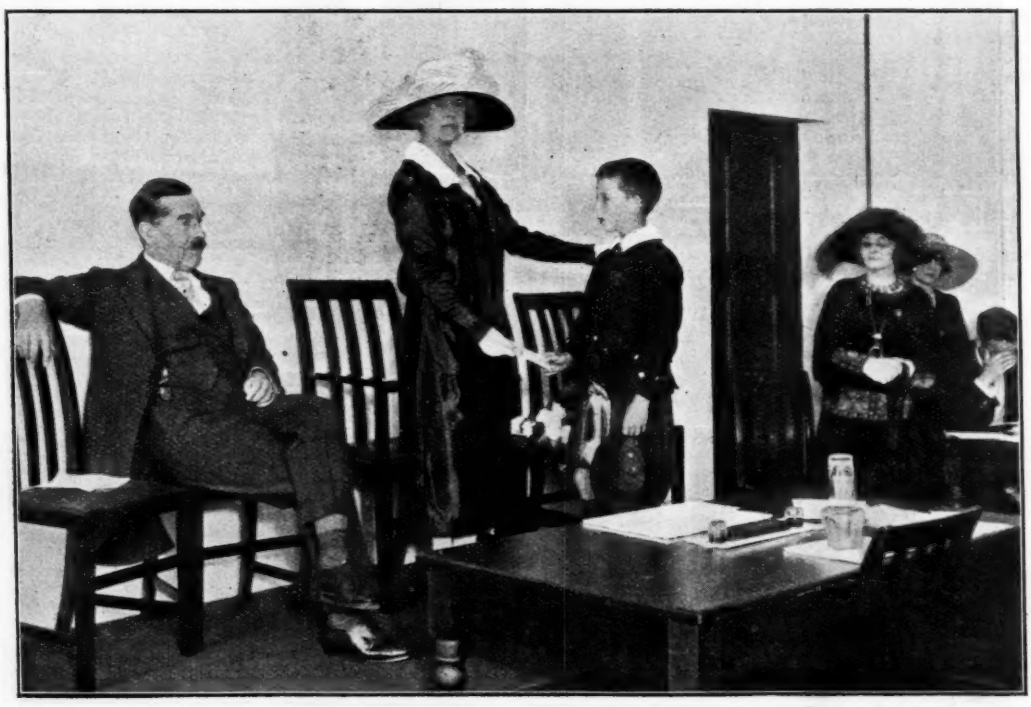
NINTH ANNUAL FAIRY GAS COMPETITION.

Prize-Giving at Wembley.

The twenty chief prize-winners in this competition and their school teachers were the guests of the British Commercial Gas Association, on the occasion of the prize-giving, from Friday, July 11, to Sunday, July 13, at the Great Central Hotel, Marylebone. The prize-giving took place on Saturday, the party being driven to the Exhibition from the hotel in a decorated coach. The prizes were distributed by Mrs. Milne Watson, wife of the President of the National Gas Council, who was presented with a bouquet by the youngest prize-winning competitor, who came from Pitlochry, in Perthshire, and was aged six years and six months.

Mr. Milne Watson, who occupied the chair, in welcoming the children and their teachers, congratulated the winners on being the first twenty in a competition for which over 100,000 forms had been issued, and in which the standard of the answers had been very high. He referred to the educational value of the competition, and to the endeavour of the Association to instruct children in an amusing and interesting way on points of domestic and personal hygiene, and on matters of national importance, such as coal conservation and smoke abatement. After reading an extract from the Judges' report, which commented on the extraordinary powers of observation shown by many of the children, he alluded to the widespread interest which the competition had aroused, entries having been received from the tiny village of Gairloch, in Scotland, and from a native postmaster (who was disqualified owing to his age being 28 years and 9 months) on the West Coast of Africa. One or two amusing "howlers" had been brought to his notice, notably the statement made by one competitor that "the British Thermal Unit should be stood on legs."

After the prize-giving, the party were shown round the Gas Exhibit, demonstrations of oxy-coal-gas metal cutting and of sweet making being given for their benefit. The former was much appreciated by the boys and their masters, who showed the greatest interest in the explanation given by the demonstrator, while not a few sticky souvenirs were carried away from the sweet-making demonstration. A visit to the Amusements Park followed, the party being allowed their own choice of amusements at the expense of the Association. The afternoon was spent in a tour of the Exhibition, the children and their teachers visiting the Dominion Exhibits, the Queen's Dolls' House in the Palace of Arts, and the Government Building. A trip on the lake was much appreciated, the weather being exceedingly hot. Not a few of the party, in spite of a tiring day, elected to stay on for the illuminations and fireworks in the evening. They returned home on Sunday, some of them delaying their departure till late in the afternoon, so as to see as much of London as possible. Before leaving, they expressed their appreciation of the way in which the week-end visit had been organized—not a single hitch occurred—and gave three hearty cheers for the Association.



KILTED YOUNG PRIZEWINNER AT WEMBLEY.

Mrs. David Milne Watson, wife of the President of the National Gas Council, presenting a prize to little William Maddin (9 years old), of Greenock, who was one of the successful competitors in the Fairy Gas Competition. The prizes were presented in the Palace of Industry on Saturday.

CATERING AT WEMBLEY.

Unfair Criticism.

Some papers, it would appear, are rather short of "copy," and in consequence have decided to spend a little spare time in a virulent criticism of the catering arrangements at Wembley. This sort of thing reminds us of the man who objected to a work of art because the gilt on the frame was scratched, and of another who could think of nothing better to say about the sea other than that it was wet. When Messrs. J. Lyons & Co., Ltd., undertook the task of catering for the vast crowds visiting the British Empire Exhibition, they entered upon a sort of pitched battle to keep pace with requirements which at certain times it is not possible to satisfy; but surely no one will deny that a magnificent and praiseworthy attempt has been made. The total area available for seating accommodation in the 54 restaurants provided exceeds ten acres, and in full operation the entire chain of restaurants has a seating capacity of 25,000. Under conditions of unusual pressure more can be served; but even in ordinary circumstances a staff of 7000 is necessary to attend to the wants of visitors. Of course, when 300,000 people visit the Exhibition on one day, the task of completely satisfying everyone has no practical solution; but to complain that because of this the catering is bad is equivalent to suggesting that the real reason why we cannot cross over to France by land is because there is no firm sufficiently enterprising to manufacture a large bailing-can.

Gas to the Rescue.

It is thought that a few notes concerning the arrangements made by Messrs. Lyons, with particular reference to their use of gas, will be of general interest. To give some idea of the situation, it may be mentioned that each week are required: 75 tons of meat, 260 tons of bread and cheese, 1500 cases of dried fruits, 2000 pineapples, 3000 tins of sardines, 2000 gallons of soup, 7000 gallons of Dover soles, 40 tons of potatoes, and 6 tons of tea—to enumerate only a few items. A special railway siding has been installed to handle the milk traffic alone. The magnitude of the task will be further understood when it is pointed out that each restaurant is fully equipped with its own kitchen and service rooms and with all the accommodation usually associated with a West End restaurant. It is significant that this famous firm of caterers have relied chiefly on gas for cooking purposes, and their daily consumption is over a million cubic feet.

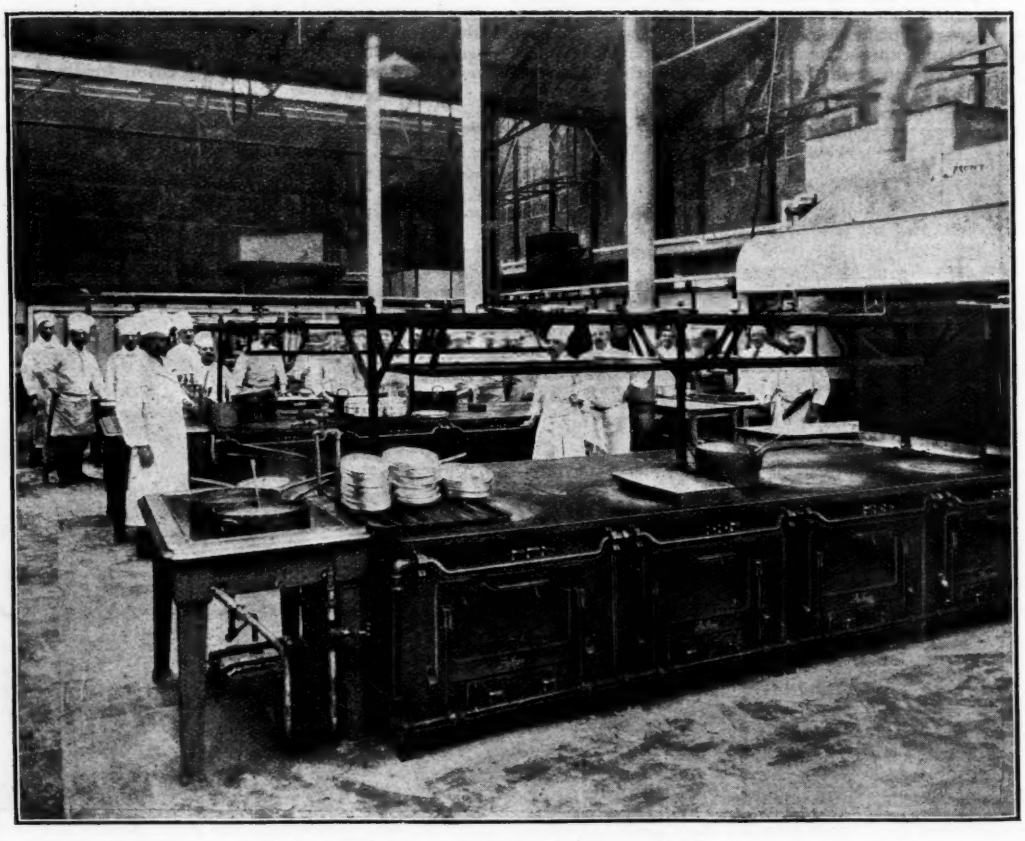
"Falcon-Smoothtop" Gas Ranges.

The prevention of smoke, and the preservation of air purity, are particularly important at such a place as the Empire Exhibition. A smoke-laden atmosphere is not only hygienically undesirable, but would doubtless create a positive prejudice against the Exhibition, and to a large extent detract from its value as a propaganda medium for Empire trade. As a matter of fact, the notable absence of smoke and the delightful clearness of the air at Wembley are due in no small degree to the fact that in all the numerous restaurant kitchens gas-heated appliances are installed. All central ranges are of the "Falcon-Smoothtop" type, manufactured by The Falkirk Iron Company, Ltd., as shown in the accompanying illustrations. Altogether 127 "Falcons" have been installed. They comprise fifteen central ranges, each consisting of six units, four central ranges of eight units, and one central range of five units.

Hitherto, it has been customary to have coal or coke fired apparatus for these central ranges, but the advent of the "Falcon" range with its enclosed smooth top, has made possible the use of gas-heated apparatus for this important part of kitchen equipment. The "Falcon" provides the substantial benefits of the enclosed hotplate as used in coal-fired central ranges, with the additional advantage that heat can be increased or diminished at will. The hotplates are among the most notable features of this equipment. They are machine finished throughout, and give a smooth cooking surface on which the heaviest utensils can be moved to and fro with the minimum effort, and without the slightest danger of tipping. All heat is utilized by the enclosed top, and gives the wide range of temperatures necessary for varying cooking operations, from red hot in the centre to 300° Fahr. at the front edge. Products of combustion are captured and carried away by means of trunk flues to the outer atmosphere.

Powerful three or four ring burners are set in the centre of each hotplate, and surrounded with heavy firebrick. Each ring has a separate control cock, so that any desired degree of heat can be obtained. Removable disc filling-in plates are fitted above the burners, so that direct heat can be had for quick boiling. The supply of secondary air to the burners is automatically controlled, each jet entraining its own necessary amount to give perfect combustion. This results in economy in gas consumption and a very high flame temperature.

In the "Falcon" ranges, the flues draw heat from the central burner in all directions, distributing it uniformly, and giving a thoroughly hot top, every inch of which is good cooking surface. The "Falcon" is conspicuous for its economical working; a 6-in. red-hot spot can be maintained with less than 50 c.ft. of gas per hour, and a 14-in. red-hot spot with a cooking temperature out to the very edges of the hotplate can be maintained with a consumption of 90 c.ft. per hour.



THE REGENT KITCHEN AT WEMBLEY, WHERE FOUR EIGHT-OVEN "FALCON-SMOOTHTOP" CENTRAL RANGES ARE IN USE.

THE GRILL-ROOM KITCHEN, WHERE FOUR SIX-OVEN "FALCON-SMOOTHTOP" CENTRAL RANGES ARE USED.

NATIONAL GAS COUNCIL.

Central Executive Board.

The Central Executive Board of the National Gas Council met on Tuesday, July 8, at the Great Central Hotel—Mr. D. MILNE WATSON in the chair.

LONDON TRAFFIC BILL.

It was reported that the Council had asked for clauses to be inserted in this Bill—(1) indemnifying a gas undertaking against any claim that might arise owing to its failure to carry out any of its statutory obligations in consequence of the provisions of the Bill prohibiting streets being broken up in certain circumstances; and (2) indemnifying a gas undertaking against any third-party claim for damages resulting from the undertaking being compelled under the Act to alter the position of, or remove, any barriers erected in connection with street works. The Council are now satisfied, however, that gas undertakings are sufficiently protected under the existing law without the insertion of such clauses; and it is not, therefore, proposed to press for their inclusion.

SPECIAL ORDER PROCEDURE UNDER SECTION 10.

It was reported that the Committee appointed by the Board to consider evidence to be submitted to the Select Committee appointed by the House of Lords in connection with proposals affecting Special Order procedure had met on the 30th ult. The Select Committee were not prepared to take oral evidence, but were willing to consider a memorandum from the Council. This memorandum had now been prepared and submitted to the Select Committee, and set forth in detail the arguments in favour of a retention of the present procedure in regard to Special Orders as laid down in section 10 of the Gas Regulation Act. It is pointed out in the memorandum, *inter alia*, that but for the existing simple and economical procedure afforded by section 10 of the Gas Regulation Act, small gas undertakings would be deterred from applying for Special Orders, and non-statutory companies would equally be deterred from applying for statutory powers. The Select Committee are holding their sittings in private, and two or three weeks may elapse before they issue their report.

MAINS OF INSUFFICIENT CAPACITY.

It was reported that since the last meeting of the Board the Council had been notified by the railway companies that they were of the opinion that no good purpose would be served by continuing the negotiations which had been in progress for some considerable time with a view to arriving at an agreed form of clause to take the place of the existing Model Bill clause with regard to relief from obligation to give a supply of gas where the mains were of insufficient capacity. It was agreed that, such being the case, there was no alternative but to contest this clause in Parliament upon the first opportunity.

LOCAL AUTHORITIES (ENABLING) BILL.

It was reported that this Bill—which established the principle of a common fund whereby the profits of one department of a corporation might be appropriated for subsidising another department working at a loss—had, happily, now been dropped.

RATING OF MACHINERY.

It was reported that, in accordance with a previous decision of the Board, the Council had written to the Departmental Committee on Rating, objecting to the definition of "First Motive Power Producing plant" proposed by the Federation of British Industries. Correspondence between the Council and the Secretary to the Departmental Committee was read; and the Board decided to leave to the Special Committee of the Council which was dealing with rating matters the decision as to whether oral or written evidence should be submitted.

ASSESSMENT OF GAS UNDERTAKINGS.

A meeting was reported between representatives of the Council and certain gas undertakings with Sir Trustram Eve, in regard to a proposal that Sir Trustram Eve was understood to have put before an Assessment Committee, that, instead of taking the gross receipts as the basis of assessment, the correct figure should be the quantity of gas sold, multiplied by the statutory maximum or standard price for gas. Sir Trustram Eve denied having made such a suggestion, and agreed to send a letter to the Council explaining his proposals.

EDUCATION SCHEME.

An application from the Scottish District for financial assistance to the extent of £200 per annum in regard to the Education Scheme of the Institution of Gas Engineers was referred to that Institution.

SMOKE ABATEMENT.

It was reported that a Smoke Abatement Bill had been recently introduced into the House of Lords, and followed closely the lines of the previous Bills upon this subject introduced by a former Government. It was agreed that a Committee of the Council should be set up to guard the interests of the gas industry in respect to this Bill.

NATIONAL GAS COUNCIL OF GREAT BRITAIN AND IRELAND.

SIXTH ANNUAL GENERAL MEETING.

The Sixth Annual General Meeting of the National Gas Council, which was held on Tuesday afternoon of last week, at the Hotel Great Central, Marylebone Road, London, N.W., was marked by an excellent attendance of members, who had the gratification of hearing a very satisfactory statement by Mr. D. MILNE WATSON, the President.

At the opening of the proceedings, the minutes of the fifth annual general meeting, having been circulated, were taken as read, confirmed, and signed.

MEMBERS OF THE CENTRAL EXECUTIVE BOARD REPRESENTING DISTRICT EXECUTIVE BOARDS AND ASSOCIATED BODIES.

The SECRETARY (Mr. W. J. Smith) reported the following list of members of the Central Executive Board appointed and nominated respectively by the District Executive Boards and Associated Bodies.

Eastern District.—Messrs. Thos. Glover, C.B.E., M.Inst.C.E., W. H. Mainwaring, R. G. Shadbolt, W. W. Townsend.
Irish District.—Messrs. R. B. Anderson, A.M.Inst.C.E., W. J. Grey, A.C.A., Joseph M'Nicholl, J. D. Smith, J.P., M.Inst. C.E.
London District.—Messrs. A. Caddick, T. Hardie, M.Inst.C.E., F. H. Jones, M.Inst.C.E., S. H. Jones.
Manchester District.—Messrs. G. S. Frith, F. A. Pye, W. J. Smith (Bolton), Samuel Tagg, M.Inst.C.E.
Midland District.—Messrs. L. E. Clift, Harold Davies, P. N. Langford, A. W. Smith.
Northern District.—Messrs. N. S. Cox, Herbert Lees, Assoc.M. Inst.C.E., T. P. Ridley, F.C.I.S., F. P. Tarratt.
Scottish District.—Messrs. Lawrence Hislop, J. W. Napier, Bailie R. G. Slorach, B.L., Councillor James Stewart.
Southern District.—Messrs. C. F. Botley, M.Inst.C.E., William Cash, F.C.A., H. C. Head, M.Inst.C.E., M.I.Mech.E., Arthur Valon, M.Inst.C.E.
South Wales.—Messrs. J. E. Kenshole, W. C. Jackson, W. H. Johns.
South-Western District.—Messrs. J. H. Ellis, S. E. Halliwell, S. J. Ingram, W. N. Westlake.
Yorkshire (West Riding) District.—Messrs. H. E. Bloor, B.Sc., B.Eng., E. H. Hudson, A. E. Mottram, Charles Wood, O.B.E., F.C.S.
Institution of Gas Engineers.—Messrs. J. Ferguson Bell, M.Inst.C.E., C. F. Botley, M.Inst.C.E., S. Tagg, M.Inst.C.E., John Wilkinson, M.B.E.
British Commercial Gas Association.—Messrs. R. Halkett, Alderman J. H. Lloyd, J.P., M.A., Alderman F. S. Phillips, J.P., D. Milne Watson, D.L.
Gas Companies' Protection Association.—Messrs. R. W. Edwards, D. H. Helps, M.Inst.C.E., A. A. Johnston, H. E. Jones.

THE REPORT.

The following report was then submitted, together with the statement of accounts for the twelve months ended March 31 last.

GAS REGULATION ACT.

Applications for Orders, Section 1.—During the period under review 101 gas undertakings have lodged applications with the Board of Trade for the substitution of a standard or maximum price per therm in lieu of their existing price per 1000 c.ft., and 146 Orders have been made.

Section 1—*Amending Orders.*—The Board of Trade issued on April 16, 1923, their rules with regard to applications for a revision of the standard or maximum price per therm granted to gas undertakings under section 1 of the Gas Regulation Act. Since that date, application has been made for Amending Orders in respect of seven undertakings.

Section 10—*Special Orders.*—During the same period 38 gas undertakings have lodged applications under this section, with a view to extending the powers conferred by their Private Acts, and obtaining additional powers.

In the period under review, parliamentary procedure in connection with Orders under this section has been altered, and in cases of opposition the Orders may be sent to a Select Committee of the House of Commons, to see whether the Order should be approved with or without modification or addition.

The Council objected to such change of procedure—unfortunately without success—upon the ground that it was cumbersome and would prove expensive to small undertakings. Further proposals have recently been made in the House of Lords for curtailing the expeditious and inexpensive method of procedure prescribed by section 10, and active steps are being taken to safeguard the position.

The Council have rendered assistance to members in the case of applications under both these sections.

APPEALS AGAINST REPORTS OF GAS EXAMINERS.

The attention of members has been drawn to the desirability of entering an appeal against any report which they had reason to believe was incorrect, and the necessity for so doing within the stipulated time. The Council have rendered useful assistance in this matter, and in one case were instrumental in obtaining the annulment of an adverse report.

ROYAL COMMISSION ON MINING SUBSIDENCE.

In conjunction with the British Water-Works Association and the Water Companies' Association, much useful work has been done in compiling information and preparing evidence to be placed before the Royal Commission. Numerous meetings have been held between the bodies in question, and the Council have given evidence before the Commission. The Council claimed that they should receive full compensation for damage done, on the basis of the cost of repairs and/or re-instatement, together with the compensation for loss of gas and third-party claims for damages; and also that the machinery for settling questions of compensation due to subsidence should be cheap and expeditious.

LONDON ELECTRICITY SUPPLY.

The opposition of the Council to the draft scheme of the Electricity Commission propounded last year was successful, the Court of Appeal deciding that such scheme was *ultra vires*. The Commissioners thereafter put forward another draft scheme on different lines, which did not call for any opposition on the part of the Council save in one respect—viz., a clause which proposed to authorize the Joint Electricity Authority, in certain circumstances and for certain purposes, "to lay down pipes for conveying water or gas, &c."

In conjunction with the British Water-Works Association, the Council opposed this clause, which was subsequently deleted by the Electricity Commissioners.

NORTH METROPOLITAN ELECTRIC POWER SUPPLY COMPANY'S BILL.

Exception was taken by the Council to a clause in the above Bill, enabling the promoters, by the construction of transformer stations and other works, to take up the whole of the space under a public highway; and a petition was accordingly lodged on behalf of the Council against this Bill. As a result, the North Metropolitan Electric Power Supply Company withdrew the offending clause.

FACTORY AND WORKSHOP ACT, 1901—CHEMICAL WORKS REGULATIONS, 1922.

The Council had continually urged upon the Home Office the necessity of issuing certificates of exemption from the above regulations in suitable cases, and particularly in the case of small undertakings. Deputations have waited on the Home Office, and it is believed that a further conference will shortly be held, after the Chief Inspector of Factories has considered a report which is being prepared by the Medical Inspector of Factories on the subject.

LOCAL BUILDING BYE-LAWS.

As the result of a number of communications received from gas undertakings to the effect that local authorities were endeavouring to impose onerous conditions upon them under the provisions of the local building bye-laws, the Council interviewed the Ministry of Health, and urged that gas-works should be classified as "exempted buildings."

It is satisfactory to record that, as a result of these representations, the Ministry have agreed to include in their new draft bye-laws a clause exempting any building (not being a dwelling-house) belonging to any person or body of persons authorized by virtue of any Act of Parliament to manufacture gas, and used or intended to be used exclusively under the provisions of such Act of Parliament.

MODEL BYE-LAWS AND REGULATIONS FOR THE PREVENTION OF CONTAMINATION, WASTE, OR MISUSE OF WATER.

The Council took exception to certain clauses in the draft specification prepared by a Sub-Committee of the Ministry of Health who were considering the above bye-laws. As drafted, these clauses would have prevented a geyser being connected in any circumstances direct to the water main. They would, in addition, have interfered with existing practice regarding gas-heated water boilers. Conferences were held between the Council and the Sub-Committee in question, and have resulted in the specification being amended in a manner which the Council consider satisfactory.

RELIEF OF UNEMPLOYMENT.

The Council have been incessant in their efforts to induce the Government to extend to gas companies the same assistance which had hitherto been available to municipal authorities in regard to the acceleration of works calculated to relieve unemployment. When the Government consented to extend grants in connection with such work to gas companies, it was found that the terms upon which these grants would be made were such as to render it almost impossible for gas companies to take advantage of them. Interviews took place with the Minister of Labour and the Unemployment Grants Committee; and it is satisfactory to report that the conditions attaching to these grants were altered in accordance with suggestions put forward by the Council.

The Committee have passed "approved" schemes—*i.e.*, schemes eligible for grants—submitted by gas companies, representing an aggregate estimated expenditure of just under £1,000,000. During the same period the Committee have approved schemes by municipal gas undertakings amounting to nearly £600,000.

WORKMEN'S COMPENSATION INSURANCE.

In consequence of the amended scale of benefits under the Workmen's Compensation Act, 1923, members who had availed themselves of the scheme introduced by the Council were asked increased premiums by the syndicate of Lloyds' Underwriters who were at the time operating the scheme. The Council considered very carefully the additional benefits provided by the Acts, and came to the conclusion that no material increase over existing rates of premium was warranted; and the brokers were accordingly approached with a view to

the concessions which had been obtained for members being maintained, but without success.

An offer was, however, received from another group of underwriters to undertake the risks in question on the original terms, with the exception that the clerical risk would be raised from 2s. to 2s. 6d. p.ct.

The attention of all members was drawn to this new offer in the "Monthly Reports," and it is understood that several undertakings have been able to effect their insurance with these underwriters at the original rates.

DIVERSION AND STOPPING-UP OF HIGHWAYS.

The position with regard to mains situated under old highways which are being diverted or stopped-up has been further aggravated by the attitude taken by the London County Council, who, in October last, passed a resolution to the effect that the grant to private statutory companies of the right to use public streets for the purpose of laying-down pipes or wires without charge, ought not to involve an obligation upon local authorities to keep such streets unaltered for ever, or, if they be altered, to bear the cost of any necessary removal and re-laying of the pipes or wires.

In view of the importance of the matter, the Council communicated immediately with the British Water-Works Association and the Incorporated Association of Electrical Power Companies, and as a result a conference was held whereat a resolution was passed protesting against the misleading statement made by the London County Council. A copy of this resolution was forwarded to the London County Council, the Metropolitan Boroughs Standing Joint Committee, the County Councils' Association, the Association of Municipal Corporations, the Urban District Councils' Association, and the Rural District Councils' Association, with a covering letter asking their assistance in resisting the proposals put forward by the London County Council. It is thought that sufficient support has been enlisted to prevent the London County Council from succeeding in their endeavours to obtain an alteration of the law on this subject.

FINANCIAL CONTROL OF TRADING DEPARTMENTS OF LOCAL AUTHORITIES.

The Conjoint Watch Committee of representatives of Municipal Trading Associations, on which the Council are represented, have had to consider several cases in which borough accountants or treasurers have endeavoured to transfer from trading departments to their own supervision matters such as payment and compilation of wages, gas accountancy books, collections, and control of storekeepers' and stores' accounts. Advice and assistance has been given, and representations have been made by the Conjoint Committee, with the result that the interests of gas departments have been adequately protected.

RAILWAY RATES.

Much work has been involved in safeguarding the position of the industry in connection with this subject during the last twelve months. The Council have been represented on the Traders' Co-ordinating Committee and the Sub-Committees of that Committee, in connection with the reduction of rates upon the carriage of coal and coke, standard terms and conditions of carriage both of merchandize and of coal, and exceptional rates both for general merchandize and coal, coke, &c.

The traders have met with considerable success. In particular, a general reduction in rates has been obtained, including those in connection with the carriage of coal, coke, and patent fuel. The position, however, with regard to exceptional rates for the carriage of coal and coke, is still not satisfactory. The railway companies have refused to agree to certain suggestions put forward in this respect, and the Council have accordingly intimated to them that, unless a satisfactory settlement in regard to this question is reached, application will be made to the Rates Tribunal for a decision.

RAILWAY BILLS.

Endeavours have been made by the Council to protect the interests of gas undertakings in legislation promoted by the railway companies this session. A questionnaire was sent out to all undertakings likely to be affected by the Railway Bills in question. It was discovered in one case that a railway sought powers to acquire practically the whole of the manufacturing plant at a small gas undertaking, without making compensation. A petition in opposition to the Bill was lodged, and a settlement highly satisfactory to the undertaking in question effected.

DOCK DUES AND CHARGES.

The Council have co-operated with the Federation of British Industries and other bodies for the purpose of obtaining reductions in dock and harbour charges, and have been successful in obtaining certain concessions. Steps have also been taken by the Traders' Co-ordinating Committee (upon which the Council are represented) to prevent railways from increasing the dues and charges at railway-owned docks; and a satisfactory settlement has been reached, controlling the position for the next five years.

The proposal of the Port of London Authority to increase largely their port charges upon coal discharged into the Port of London was strongly resisted. A deputation waited upon the Port Authority, and as a result a concession of ½d. per ton was obtained.

MAINS OF INSUFFICIENT CAPACITY.

Railway companies have consistently opposed any Special Order under section 10 of the Gas Regulation Act which contains a clause removing the obligation of a gas undertaking to give a supply of gas for any purpose other than lighting or domestic use in any case where the capacity of the main is insufficient for such purposes at the date when such notice is served. The Council have conferred with the railway companies with a view to arriving at a suitable wording of the clause in question which would be agreeable to both parties. Negotiations in this matter are still proceeding.

PROPOSED STANDARD SPECIFICATION FOR ILLUMINATING MATERIALS.

At the invitation of the British Engineering Standards Association, a representative of the Council was appointed to attend a conference to decide whether it was desirable that such a specification should be drawn up. The conference having reported in the affirmative, a Sectional Committee is to be appointed to draft the specification, and a representative of the Council has been nominated to serve thereon.

STANDARD COOKERS.

The master patterns and jigs for which an order was placed with the Parkinson Stove Company, Ltd., have been completed, and inquiries have been made for applications from makers of gas-stoves willing to undertake the production of the Council's standard cooker. Agreements have now been entered into between the Council and three firms of stove manufacturers for the production of standard cookers in the No. 2 and No. 3 size. Incorporated in the agreement is a schedule of maximum prices (net) for complete cookers and parts thereof. These prices were published in the Council's report for the month of February, 1924.

Sample cookers have been distributed to each of the districts, and an opportunity has been afforded members of inspecting these samples at the district meetings. Samples were also on view at the National Gas Exhibition in Birmingham, and are now displayed in the British Empire Gas Exhibit at Wembley. It is proposed in the near future to obtain quotations for the supply of large quantities of these cookers from those firms engaged in their manufacture.

EXHIBITIONS.

The Council have co-operated with the other associated bodies working for the benefit of the industry for the purpose of producing an exhibit at the British Empire Exhibition worthy of the gas industry, and have made a considerable contribution towards the expenses of the exhibit. The Council also extended their patronage to the successful National Gas Exhibition, organized by the Birmingham Gas Department, and held in that city in September last.

DISTRICT EXECUTIVE BOARDS.

The continued valuable assistance rendered by the District Executive Boards, Management Committees, and District Secretaries has proved most helpful, and the thanks of the Council are again due to them.

CO OPERATION.

It will be seen from the report that every opportunity has been taken to co-operate closely with the other public utility services on all matters of common interest. The Council are appreciative of the readiness of the other bodies to assist, and feel sure that the position of each of the interests concerned has in consequence been materially strengthened during the past twelve months. The continuance of this policy will, it is felt, prove even more beneficial in the future.

GENERAL.

The foregoing indicates only the main features of the year's work In addition, advice and assistance on a great variety of subjects have been given to a very large number of individual members, both by letter and interview, and the work of the Council in this respect has been much appreciated.

Income.—The total amount received by the Council by way of joint subscriptions to the National Gas Council, the British Commercial Gas Association, and the Institution of Gas Engineers (for research work) during the period under review, amounted to £51,792, of which £13,619 is retainable for the purposes of the National Gas Council.

To the above figure of £13,619 there must be added interest—viz., £223—making a total of £13,842, of which £1731 has been carried forward (being the proportion of subscriptions paid in advance) to meet the expenses which will be incurred during the financial year 1924-25. The income of the National Gas Council in respect of the year ended March 31, 1924, including the amount of £2041 brought forward from the last account, was therefore £14,152.

Expenditure.—The expenditure of the Council for the past year amounted to £14,893. The deficit on the year's working is therefore £741, which increases the accumulated deficit at the date of the last account to £2255.

Reserve Fund.—Of the sum of £1943 shown in the last account as the balance of the reserve for the purchase of furniture and fittings for the Council's Offices at No. 30, Grosvenor Gardens, and for the expenses in connection with the acquisition of the premises in question, £422 has been used to liquidate the suspense account balance as at March 31, 1923, and £221 has been expended for the purpose of additional office equipment, leaving a balance of £1300.

Membership.—The total number of undertakings subscribing to the funds of the Council at March 31, 1924, was 838, representing 87 p.ct. of the total make of gas in the United Kingdom.

THE PRESIDENT'S STATEMENT.

The PRESIDENT (Mr. D. Milne Watson), in moving that the annual report and audited statement of accounts for the twelve months ended March 31 last, as circulated, be approved and adopted, said: When I had the pleasure last year of addressing you from this chair, the industry was just emerging from a period of severe criticism in regard to the composition of gas; and I referred at the time to the wild statements which had gained currency throughout the country with regard to the risk of carbon monoxide poisoning. The past year has fortunately been comparatively free from alarms of this nature, and the Council have been at liberty to concentrate their attention on a number of varied subjects of great importance to the industry, many of which are referred to in the report which is now before you.

SUCCESSFUL CO-OPERATION.

Before dealing with the past year's work in detail, I would like particularly to draw your attention to the number of occasions upon which the Council have been able to co-operate with other bodies whose interests lay parallel with their own. Apart from being represented upon several Committees of the Federation of British Industries, the Council have been able to work on many occasions in conjunction with the British Water-Works Association, and, when necessity arose, with the Incorporated Associa-

tion of Electrical Power Companies. Such co-operation as this has undoubtedly operated to the mutual advantage of the bodies concerned, and I hope that in the future this policy of co-operation may be continued. Conspicuous instances of the success of this joint working are to be found in the preparation of evidence for submission to the Royal Commission on Mining Subsidence, and in the opposition to the attempt proposed to be made by the London County Council to amend the law with regard to the cost of removing mains situated under all highways which are being diverted or stopped-up. With regard to the former matter, a very great deal of work was entailed in the preparation of the evidence to be submitted by the Council to the Royal Commissioners. In pursuance of the policy of co-operation to which I have referred, many meetings took place between our representatives and those of the British Water-Works Association and the Water Companies' Association, with the happy result that, after a full and free interchange of views, it was possible to urge identical claims —namely, full compensation for damage done on the basis of the cost of repairs and re-instatement, together with compensation for loss of gas or water, and third-party claims for damages. In my view, this question of mining subsidence provides an excellent example of the necessity of an organization such as the National Gas Council. But for the Council, it would have been impossible for the industry to have adequately represented its views on this question, the importance of which can be gauged by the fact that, in the case of certain undertakings, from 25 to 33 p.ct. of the gas made is lost owing to the ravages of subsidence. A questionnaire was sent to every undertaking situated in a mining district, and a Special Committee was set up to co-ordinate the views of the industry. The proof of evidence submitted to the Royal Commission has been printed in the Council's "Monthly Reports;" and I think you will agree that the claims put forward on behalf of the industry are only just and equitable. I trust that the evidence submitted will result in considerable relief being obtained by the undertakings injuriously affected. It has been arranged that the Royal Commissioners shall visit the localities where gas undertakings have suffered particular damage, and it is my hope that these visits will prove to the Commissioners the necessity for taking immediate steps to remedy to-day's inequitable situation.

An Extraordinary Resolution of the L.C.C.

You will expect me, I feel sure, to amplify somewhat the statement appearing in the annual report with regard to the extraordinary resolution of the London County Council to the effect that the grant to private statutory companies of the right to use public streets without charge for the purpose of laying-down pipes or wires ought not to involve an obligation upon local authorities to keep such streets unaltered for ever, or, if they be altered, to bear the cost of any necessary removal or re-laying of the pipes or wires. In the first instance, I would observe that this question is not one which affects London only, because the London County Council have circularized the Association of Municipal Corporations, the County Councils' Association, and the Urban and Rural District Councils' Associations, asking for their support in obtaining an amendment of the present law. It must also be noted that the resolution entirely ignores the fact that gas undertakings contribute very heavily to the rates in respect of their mains. It is untrue to state that undertakings use the highways "without charge." ["Hear, hear."] The Council immediately adopted active steps to counter the tactics of the London County Council with regard to this matter, and took the initiative in summoning a joint meeting between representatives of the Council, the British Water-Works Association, the Water Companies' Association, and the Incorporated Municipal Electrical Association. These organizations unanimously agreed that the proposals of the London Council should be opposed, and that a counter circular should be sent out to the Associations who had previously been circularized by the London County Council. You will be interested to hear that two of these bodies—namely, the Urban and Rural District Councils' Associations—have stated in answer to the circular that they are prepared to oppose the suggestions put forward by the London County Council, and I feel fairly confident that our timely action has been successful in frustrating an insidious attempt by a powerful body to place upon the gas consumer a burden which should properly be borne by the community at large. ["Hear, hear."]

Legislation by Departmental Regulation.

Another aspect of the year's work which is most noticeable is the necessity that has been imposed upon the Council, for the purpose of protecting the industry, of combating the onerous provisions contained in divers regulations and by-laws which, had they become operative, would certainly have hampered and harassed undertakings in their operations. This practice of legislation by means of Departmental Regulation is, in my opinion, very dangerous, and often results in bestowing upon Government officials the status of industrial autocrats. I trust that this procedure will not be extended. Much work has been incurred, in particular, in connection with the model by-laws and regulations for the prevention of contamination, waste, or misuse of water. A specification as originally drafted in connection with these by-laws contained clauses which would have prevented a geyser being connected in any circumstances direct to the water main, and would undoubtedly have arrested the development of gas-heated water supply along lines which experience has shown to be both safe and efficient. Representations were made to the Ministry of Health, and several interviews took place between representatives of the Council and the Ministry. I am happy to say that, in consequence of the presentation of the Council's objections to the specification, important and satisfactory modifications have been made in these regulations. There are certain outstanding questions with regard to which difficulties still exist. These difficulties are not, however, insuperable, and if treated in the same reasonable spirit as has hitherto been displayed on both sides, there is no reason why they should not disappear. We have also been successful during the past year in obtaining the inclusion of gas-works as "exempted buildings" in the model building by-laws. This amendment became necessary as a result of the onerous conditions which local authorities endeavoured to impose upon gas undertakings in relation to buildings erected upon scheduled lands. It was felt that the designing and construction of modern gas-works buildings might safely rest in the hands of gas engineers and engineering contractors, and that it was unreasonable to allow the surveyor to the local authority, however competent an engineer he might be, to exercise a veto upon building plans which had been carefully prepared by experts in that branch of engineering.

Unemployment Grants.

I now turn to another subject which you will find mentioned in the report—namely, the relief of unemployment. I refer to the extension to gas companies of the grants which had hitherto been available to public authorities in regard to works put in hand for the relief of unemployment. Many interviews proved necessary before the Government Departments concerned could be induced to believe that gas companies were able, and willing, to take their part in the promotion of schemes for the relief of unemployment. When at length the Government realized that such actually was the case, the Council found that the conditions under which assistance would be granted were so framed as to make it quite impossible for gas companies to comply with them. Further interviews and correspondence ensued, with the result that, after much discussion and delay, these conditions were re-drafted in practicable form. That the Council were amply justified in asking to be included in the scheme undertaken by the Unemployment Grants Committee, is, I think, clearly indicated by the figures which appear in the report. Since last September, when the first application by a gas company was approved, the Unemployment Grants Committee have sanctioned schemes representing an aggregate expenditure of upwards of £1,000,000. During the same period, schemes put forward by municipal gas undertakings have been approved to the extent of nearly £600,000. The work to be undertaken comprises, *inter alia*, the extension of mains to outlying districts, the enlargement of plant, the substitution of horizontal for vertical retorts, and gasholder construction; and the grant has amounted in at least one case to 25 p.ct. of the total expenditure authorized. By taking advantage of the facilities offered by the Government, the industry has been able to assist in reducing the number of men who are so unfortunately unemployed to-day.

Railway Matters.

You will observe that the Council have been active in many directions in protecting the interests of the undertakings in connection with railway matters. The question of immediate importance is, of course, that of the high rates charged to-day for the conveyance of goods and merchandize, including coal and coke. The Council have spared no effort to get these rates reduced, and—working in conjunction with the Traders' Co-ordinating Committee of the Federation of British Industries, and also with the Mining Association of Great Britain—have succeeded in obtaining some concessions from the railways in the form of general reductions. As you are aware, the old statutory provisions with regard to the maximum charges that can be made by railways are now being revised, and proposals have been made by the railways with regard to the standard charges which will be payable by traders in the future in accordance with the provisions of the Railways Act, 1921. These proposals have been most carefully scrutinized by the Council, and objections have been lodged with regard to every item that might possibly concern the industry. An inquiry into the subject will take place—probably this autumn—and you may rest assured that the case for the Council will be adequately presented. I am hopeful that some of the proposals at present put forward by the railways will be considerably modified in favour of the trading community. The interests of the industry have also been watched with regard to many other important railway questions which are too technical in character to allow of being dealt with this afternoon. Questions, however, such as those of the standard terms and conditions of carriage of merchandize and of coal, and the "exceptional rates" to be charged in future, are, of course, of grave concern to the industry. I should add that the position with regard to "exceptional rates" on the carriage of coal and coke is still somewhat unsatisfactory, and it may be necessary for the Council to apply to the Railway Rates Tribunal for a decision for the purpose of ensuring that gas undertakings to-day are entitled to at least as favourable "exceptional rates" as in the past. While speaking of railway matters, I should refer to the steps that were taken by the Council to protect the interests of gas undertakings in connection with legislation promoted by the railway companies this parliamentary session. A questionnaire was sent out to every undertaking which appeared

to be affected by the Railway Bills in question, for the purpose of discovering whether their interests were being prejudiced thereby. As might be expected, a large number of undertakings had in many instances already taken the necessary steps to safeguard their own position; but this, of course, as you can readily imagine, was not always practicable in the case of the smaller undertakings. In one instance, the Council found it necessary to assist an undertaking in lodging a petition in opposition to a Bill which was proposing to sanction the construction of a line of railway right through its works, without any compensation being made. You will be glad to hear that the Council's efforts in this respect achieved considerable success, and a settlement highly satisfactory to the undertaking was effected. This, in my opinion, affords a striking example of the excellent work that can be done by the Council in protecting the interests of the smaller members when fighting powerful corporations, and at the same time preventing awkward precedents from creeping into railway or other Bills, which precedents might be used at a later date to the detriment of the industry as a whole. Again, the railways have been somewhat contumacious in their opposition to any Special Order under section 10 of the Gas Regulation Act incorporating the Model Bill clause with which you are all doubtless familiar—namely, that dealing with relief from obligation to give a supply of gas where the mains are of insufficient capacity. Until quite recently it appeared as though the railway companies, at the suggestion of the Director of Gas Administration, would be willing to agree with the Council a suitable wording of this particular clause. When the annual report was drafted, conferences had already taken place, and negotiations were still in progress. Unfortunately, since that date the railway companies have informed us that no useful purpose would be served by continuing discussion on the matter, and it will therefore, I think, be necessary to settle this question definitely before a Select Committee of the House of Commons.

The Danger of Precedents.

While mentioning the question of Orders under section 10 of the Gas Regulation Act, there are two matters to which I must particularly refer. The first is that I desire to emphasize the vital importance of members refraining from inserting any new clause in their Special Orders, or having any such imposed upon them, without first consulting the Council. It is of the utmost importance, as I have said before, that precedents should not be allowed to creep into these Special Orders, precedents which—as has happened in the past in the days of Provisional Orders and Private Bills—will one day react to the detriment of other undertakings, and, indeed, of the industry as a whole. There are very many cases to-day where undertakings are regretting that, for one reason or another, they were compelled in the past to agree to clauses, the consequences of which are oppressing them at the present time. This is noticeable in many instances with regard to clauses for the protection of county councils in connection with the laying or repairing of pipes under main roads and bridges. I hope, therefore, that in the future no undertaking will agree to the insertion of a novel clause without taking the advice of the Council in the first instance.

Special Orders.

It is somewhat perturbing to note the endeavours that are now being made in Parliament to whittle away the advantages of the present procedure, and make it more analogous to the cumbersome and expensive Provisional Order or Private Bill procedure of the past. Recently a debate was initiated in the House of Lords by Lord Salisbury, suggesting that the granting of Special Orders to gas and electricity undertakings by means of the Gas Regulation Act and the Electricity Supply Acts removed from Parliament all adequate control; and the proposal was put forward that every Special Order, while in draft, should be scrutinized by the Lord Chairman and the Chairman of Committees. If this scrutiny were to disclose any important question, the Special Order would be sent to a Select Committee of the House to be dealt with, in a similar manner to Provisional Orders in the past. The Government did not accede to this proposal, but agreed to set up a Select Committee "to consider the conditions under which in various Acts of Parliament it is provided that schemes or Orders shall acquire or retain the force of law upon the passing of an affirmative resolution by both Houses of Parliament, and to report whether, in so far as the House of Lords is concerned, any, and, if so, what, safeguards in the procedure under which these resolutions are submitted are required in order to preserve adequate control by Parliament over the provisions of these schemes or Orders." This step appears to me to be highly retrograde in character. The object and contention of Special Order legislation was, as I understand it, to enable gas undertakings to extend and modernize their statutory powers with the minimum delay and expenditure. One hears on all sides of the paramount necessity of decentralization as regards Parliament, and one would have thought that no more appropriate subject could be delegated to competent experts such as the Director of Gas Administration, than the technical matters specifically dealt with in Special Orders. As you may well imagine, the Council were not slow to move in this matter. We immediately requested to be allowed to give evidence before the Select Committee. The Committee have not yet decided to hear any evidence, but are at present considering a printed memorandum on this question which we have put forward. The smaller undertakings view with grave alarm the proposals of the House of Lords with regard to section 10 procedure, and will, I fear, be deterred from applying for Orders under this section—in the same way as non-statutory companies will be deterred from applying for statutory powers—if there is any likelihood that they will be compelled to incur serious expenditure in obtaining such Orders.

Wembley.

I should much like to have been able to say a word about each of the subjects mentioned in the annual report, but this is quite impossible in the time at my disposal. You will note, however, among the points with which I have not dealt, that agreements have now been made with three well-known firms of stove manufacturers for the production of standard cookers, and the Council hope to be able to obtain in the near future quotations for supplies in large quantities. No review of the year's events would be complete unless some reference were made to the enterprise shown by gas undertakings in promoting the Gas Exhibit at Wembley, and in supporting the Exhibition organized by the City of Birmingham Gas Department last September, and the great success which has been achieved. Our best thanks are due to those who have been responsible for carrying out all this work. The Council eagerly co-operated with kindred Associations, and I am proud to think that the gas industry as a whole has worthily availed itself of the opportunity (which I ventured to predict last year would be an unprecedented one) for demonstrating its true value to the world at large. While mentioning Wembley, brief reference should be made to the part the industry has played in the First World Power Conference. It became necessary early in the year to make representations that a Gas and Fuel Section should be formed in order that the full potentialities of power development should be included. I think you will agree that the session we held yesterday was full of interest, not only to the gas industry, but also to all those intimately concerned with the development of power production. I cannot help feeling that a great amount of good has been done by it. I wish to take this first opportunity of publicly thanking all those who expended so much time and labour on producing the excellent papers which we heard, and also all those others who attended the Session and in this way contributed to the success of the conference. The growing popularity of gas is becoming more and more evident, and the eyes of the public are being opened to its almost unlimited potentialities. Never have the prospects of the industry been brighter, and I am sure that mutual support and co-operative effort will promote the prosperity of every undertaking, both large and small, throughout the length and breadth of the land.

Finance.

When you consider the work that has been accomplished, and when you realize that this has all been done at an expenditure of about one-seventieth part of a penny per 1000 c ft. of gas sold, I think you will agree that the Council must be acquitted of any charge of extravagance. We are right in the midst of work at the present moment, and I feel sure, as I have said before, that the National Gas Council are performing a very useful part to the gas industry of the country. (Applause.)

The Accounts.

Mr. William Cash, F.C.A. (a Vice-Chairman of the Centra Executive Board), in seconding the resolution that had been moved by the President, said it was unnecessary for him to add anything on the matters which had been so fully and so well dealt with in the address to which they had just listened. He might, however, say a word or two with regard to the accounts. It would be seen that the total income applicable to the year was just under £14,000—not quite so much as for the year 1922-23, when the figure was something like £15,000. This was partly accounted for by the fact that in the earlier year there were some subscription arrears received. The expenditure in the past twelve months was £14,893, as compared with £14,152 in the previous year; but the expenditure on this occasion included £2350 given to the British Empire Gas Exhibit Committee, which was an altogether exceptional matter. Having regard to this fact, the expenditure was very satisfactory. The Council were doing excellent work; and what they would do without such a body now, he really did not know. What could be accomplished by one central body like that was very different from what could be done by them individually. There were many matters which individual undertakings could not possibly tackle by themselves. Therefore they all subscribed to the Council, and felt they were getting good value for their money. It was the duty of every undertaking to support such a body.

Local Building By-Laws.

Mr. R. M. Rowe (Ilfracombe Gas Company) said that, before the motion was put, he would like, as the representative of a small undertaking, to offer his hearty congratulations to the Central Executive Board upon the excellent fight they had put up in connection with the local building by-laws. It was most pleasing to reflect that the Board were able to convince Mr. Wheatley of the unreasonableness of the attitude assumed by local authorities in endeavouring to impose onerous conditions upon gas undertakings in connection with the new model by-laws which were in course of preparation by the Ministry of Health. Small undertakings owed a very deep debt of gratitude to the Executive Board for the work they had done, even in this little matter, and this debt he was desirous of voicing.

The motion for the adoption of the report and accounts was then unanimously agreed to.

OFFICE-BEARERS.

Alderman F. S. PHILLIPS, J.P. (Vice-Chairman), said it was his privilege to make a proposal with regard to the Presidency of the National Gas Council. For the last five or six years they had got on exceedingly well. That day they had heard what work had been done, and had formed their own idea as to who ought to be the President. With this idea he agreed, and he was going to move that Mr. Milne Watson be re-elected to the position of President. He was not going to use any flattering language; it was not necessary. The work which had been done, and the way in which it had been done, was ample evidence of how fortunate they were in having a gentleman willing to take the position of President who had the ability and the influence of Mr. Milne Watson. (Applause.)

Mr. J. H. ELLIS (Vice-Chairman) seconded the proposition. He said Mr. Milne Watson was their natural leader. It was fitting that the President of the National Gas Council of Great Britain and Ireland should represent the largest gas undertaking in the world. Mr. Milne Watson possessed inestimable qualities. He was a born leader of men. He was a general who was at once wary and wise; courageous without being rash. He not only had the confidence of the Government Departments with whom he was associated, but he also had the confidence, and the affection, of those whose privilege it was to be represented by him. They were all delighted to have the opportunity of thus recognizing the great services he had rendered to them and to the industry at large.

The meeting having expressed hearty concurrence in these sentiments,

Mr. MILNE WATSON remarked that his election for the sixth time as President, together with all the nice things that had been said, rather embarrassed him. However, he could only say: "I thank you, my Merry Masters"—because he felt he was their servant, and must do as they told him. If they wanted him to be their President for another year, he would be pleased to fall in with their wishes.

On the motion of Mr. CHAS. WOOD, seconded by Mr. NORMAN S. COX, Alderman Sir William Kay, J.P., was unanimously re-elected Hon. Treasurer of the Council.

Thereafter the following were re-elected:

Trustees.—Alderman H. Wade Deacon, C.B.E., J.P., and Alderman J. H. Lloyd, M.A., J.P.

Hon. Secretaries.—Messrs. F. W. Goodenough and W. E. Price, Assoc.M.Inst.C.E.

Auditor.—Mr. Alfred Morland, F.C.A.

On the proposition of Mr. CASH, a hearty vote of thanks was passed to the staff for their services during the past year—the names of Mr. Fottrell, Mr. Ogilvie, and Mr. Smith being specially mentioned.

Mr. FOTTRELL acknowledged the vote, and the proceedings closed.

THE VALUE OF AMMONIUM SULPHATE.

Conclusive Experiments at Rothamsted.

From time to time in our columns indication has been made of the growing recognition of the value of ammonium sulphate as a fertilizer. In the "JOURNAL" for June 25, for example, it was mentioned that the home consumption during 1913-14 was 40,000 tons, while in 1922-23 it amounted to no less than 140,000 tons—proof that the claims made for this artificial manure are well founded. Last week we had the opportunity of visiting the Rothamsted Experimental Station at Harpenden, where for many years past important investigations into the properties of ammonium sulphate and other fertilizers have been carried out. As is well known, Rothamsted is the chief centre in the British Isles for this type of experimental work, and the oldest agricultural experimental station in the world; and great reliance is placed in the findings of those responsible for the researches.

THE FIELD WORK AT ROTHAMSTED.

The field experiments at Rothamsted were begun as far back as 1843, when farmyard manure was the best-known agent for maintaining the fertility of the soil under tillage conditions. Supplies, however, were insufficient, and knowledge was needed of the sources of the food supply of plants and the fertilizer requirements of the common farm crops. To obtain this knowledge, one field was assigned to each crop and divided into a number of plots, each receiving a different manurial treatment. Each field was drilled year by year with the same crop, and every plot received annually the same quantity of the same manures. Systematic observations were made of the yields under the varying conditions, while information was also obtained as to the chemical composition of the crop and of the drainage water. These "classical" fields are still maintained under their original treatments, and present an unrivalled series of demonstration plots, as well as material for fuller investigation. The outcome of this early work was the introduction of superphosphate, sulphate of ammonia, and nitrate of soda as manures, determination of the correct use of these substances, and the realization that judicious artificial manuring could do much to supplement and economize farmyard manure. Of course, during recent years the number of field experiments has been considerably increased, to deal with problems of present-day importance as they arise. This work is of great interest; but it is not our intention in this short article to do other than show that the work carried out at Rothamsted on artificial manures has proved conclusively the value of ammonium sulphate.

INCREASED YIELDS WITH AMMONIUM SULPHATE.

One field which we visited had grown wheat continuously from 1843. An unmanured control plot gives a yield of 12 bushels of wheat. One which has received 14 tons of dung per acre gives 34 bushels; and it is interesting to compare this with three others to which have been applied minerals and increasing amounts of ammonium sulphate. With 206 lbs. of sulphate per acre, the yield is 22 bushels, with 412 lbs. 31 bushels, and with 618 lbs. 35 bushels—the latter actually being in excess of the yield from the plot manured with dung.

The elements for which there is the greatest demand by the plants, and which the soil does not usually contain in sufficient quantities, are nitrogen, phosphorus, potassium, and calcium; and manuring, apart from the physical and mechanical advantages which it confers on the soil, resolves itself into the proper supply of these four elements. Of the four—all essential for the proper growth and development of the plant—the most important is nitrogen; and a sufficient supply of this is the key to successful fertilizing. This fact is well exemplified in the results of trials which are being made on potato crops. It is shown that applications of sulphate in excess of general practice produce a darker and more robust plant, and that the optimum dose is 3 cwt. per acre.

We were taken round the plots by Mr. H. V. Garner, B.A., B.Sc., who emphasized the need for arriving at a correct balance in the various constituents of the manure applied—that selection and not mere bulk should receive careful consideration.

SULPHATE OF AMMONIA AS A WEED-KILLER.

One of the latest applications of ammonium sulphate is its use as a weed-killer. The experience of the last few years has shown that cornfield weeds can be effectively destroyed by the use of sulphate of ammonia as a spray. At the same time, not only does the corn crop remain undamaged, but usually the yield of grain is increased to about the same extent as if an ordinary spring top-dressing of sulphate had been used. For several years a 3 p.ct. or 4 p.ct. solution of copper sulphate has been employed for the purpose; but it is a strong poison, it possesses no manurial value, and it usually imposes a severe check on the cereal crop. Sulphate of ammonia has all the advantages of copper sulphate, with none of the disadvantages. It can be applied without any additional apparatus other than the ordinary barrel and pump spray. Its action is very interesting. The leaves of weeds have a "hairy" surface, while those of cereals are smooth and "waterproof." The spray of sulphate adheres to the former and flows off the latter. As the sun dries the liquid, the concentration of sulphate on the leaves of the weeds is increased, and this draws the moisture from the plant, which gradually dies of starvation. Not only this; the action of the sulphate also inhibits the seeding of the plant, which is the most important feature of weed destruction. Unquestionably this new use of sulphate will be of great benefit to the farmer.

THE LABORATORIES OF THE ROTHAMSTED STATION.

The laboratories fall into two main groups—(*a*) biological, and (*b*) chemical, mathematical, and physical. The bacteriology department investigates the micro-organisms of the soil, both quantitatively and qualitatively; while the botanical section deals chiefly with the relation of plants to the substances required for their nutrition. The beneficial or harmful effects of individual elements are investigated, and practical comparative tests are made of various types of manures. The researches in progress include the relation of boron to plant growth, the effects of various dressings of sulphate of ammonia on barley, and the manurial action of silicates, peat fertilizers, and basic slag. The main work of the entomological department is the study of fundamental problems concerning insects in relation to agriculture. Then in the fermentation section work is carried out on the preparation of synthetic farmyard manure from straw and ammonium sulphate. The chemical constitution of the soil, with a view to the elucidation of chemical changes involved in plant nutrition, receives attention in the chemical department. In the insecticide and fungicide department, researches are in progress on the toxicity of chemical compounds to insects, with the object of relating chemical composition and physical properties to toxicological action, and various other problems connected with plant diseases. The object of the physical department is to study the general environmental conditions in the soil; and the work is being applied both at home and abroad to practical questions of soil cultivation, control of soil moisture, soil acidity, &c. The statistical section is a clearing house for the numerical observations of the station, in connection with both laboratory experiments and field trials, at Rothamsted and at other centres.

This account is of necessity only a brief survey of a most instructive visit; but it does show that the future for ammonium sulphate is very sure and bright, and that its exploitation is as yet in its infancy.

THE FIRST WORLD POWER CONFERENCE.

GAS AND FUEL SECTION.

A REPORT was given in last Wednesday's "JOURNAL" of speeches made at a luncheon at Wembley on Monday of last week, in connection with the Gas and Fuel Section meeting of the First World Power Conference, and abstracts were published of two of the papers read on that occasion. There were morning and afternoon sittings in one of the largest of the conference rooms, and the crowded audience, the animated proceedings, and the excellence of the papers presented, all spelt in large letters the word "Success." There were in all eight of these papers. A further instalment of abstracts will be found in this issue, and the remainder will be published as opportunity offers. Mr. D. MILNE WATSON (President of the National Gas Council of Great Britain and Ireland) presided.

The CHAIRMAN, in opening the proceedings, explained that they were not there entirely to talk about gas to gas people. Among them were a large number of representatives who were interested in electricity and water power, and this must be borne in mind in their discussions. This was also his excuse for offering a few preliminary remarks on gas, because as some of those in the room were not connected with that industry it would be well that there should be some kind of general indication to enable them to understand exactly where gas came into this World Power Conference. The gas industry came into existence more than a hundred years ago. It was in every sense of the word a "pioneer" industry, and was among the earliest of what are known as "Public Utility Services." It has grown to be one of the most important industries of the country, as is shown by the fact that at the present time it uses in the year 16 million tons of coal and 46 million gallons of oil, and produces in the same period no less than 250,000 million c.ft. of gas, together with 8 million tons of coke and large quantities of other bye-products. Of the coal that goes into a gas-works nothing is wasted. Less than 12 p.ct. of it is utilized to provide the heat necessary for its carbonization. Everything else is recovered for the community in such form as enables its full value to be realized—that is to say, partly as gas, a highly efficient source of light, heat, and power; partly as coke, a source of heat or power, more efficient than its equivalent weight of coal; and partly as residuals. Both gas and coke supply these services without any of the fouling and darkening of the atmosphere which attend the use of raw coal in grates and under boilers. As tar, ammoniacal liquor, and cyanogen liquor, the residual products of gas manufacture and its purification provide the bases of an almost infinite number of chemical substances that are lost to industry when coal is burned instead of being carbonized by distillation. These are the main facts upon which rests the claim of the gas industry to serve the two national causes of conservation of our dwindling coal supplies and purification of the atmosphere of our towns and cities—the conservation, that is, alike of our wealth and of our health. The capital invested in gas, in respect of both company and municipal undertakings, amounts to £163,000,000. Over 100,000 workers are employed, exclusive of those who are engaged in the manufacture of the plant used for gas making, and also of the large number employed in the making of gas-fires, cookers, furnaces, engines, &c.

With regard to its relations with labour, the industry has taken a leading part in formulating schemes of co-partnership whereby the workers are encouraged and given facilities for investing their savings in the stock of the company by which they are employed. A large number of gas companies have now co-partnership schemes in operation. The amount of stock held by the workers under the arrangement is considerable, and in this respect gas companies are doing an important work in pointing the way to industrial goodwill. In the methods of manufacture of gas great progress has taken place, and with the advance of chemical science new methods of purification have also been adopted. It may safely be said that nothing is now thrown away that comes from gas manufacture, and every year new substances are being discovered which have their origin in the bye-products of gas manufacture. As a source of power, gas and its bye-products play a very important part in the industries of the country. Gas itself is used in engines and in furnaces. Coke is largely used to raise steam, and benzole is used in internal combustion engines for power purposes. Other constituents of coal tar—naphthalene and phenols—have been suggested as sources of power. It has been proposed to hydrogenate exhaustively, not only these products, but even low-temperature tars, and to use as motor fuels the materials thus obtained. Under present conditions these processes are of problematical value; but under war conditions, or if the present financial value of the materials concerned were seriously to alter, some might be found useful.

To sum all up, gas is a useful servant to the community in endless ways. Moreover, it is in the power of the industry to serve mankind even better in the future than in the past. It is not to be supposed that we have reached the end of our resources. At the present moment research work is going on, not only in the various works and laboratories, but also in the universities, in order to extend our knowledge. Every year improvements are being made and new processes discovered for the more effective manufacture of gas, the saving of coal, and for greater efficiency in the use of gas in consumers' appliances. There are those who maintain that further developments will be on the lines of total gasification of the coal; but this remains to be seen. At any rate, the gas industry is not lagging behind in the exploration of new possibilities. It is realized by the industry that no problem concerning the production of power will be satisfactorily solved unless we, in common with the other power producers represented here, exercise our powers of imagination, seeking to understand the trend of events and the possibilities of the future. We must see visions and dream dreams, and endeavour to visualize to-day the needs of the community of to-morrow. We must aim at supplying power in such a way as to avoid the production of smoke. "It is," the Chairman went on, "unsafe to prophesy, but I venture to predict that a hundred years hence our industrial cities will be smokeless. I believe a time will come when the storage and transport of solid fuel to any appreciable extent will be unknown, and when the black fog, which is the curse of our cities, will be eliminated. I am convinced that in the accomplishment of these great ideals the gas industry will play its proper part in the future, and do much to make the lives of the people easier, and our towns brighter and pleasanter places in which to live. The problems before the country to-day involve the duty of preserving (1) the wealth of the country, and (2) the health of its people. It can be confidently asserted that the gas industry is playing its part in a thoroughly practical manner in this respect."

THE PAPERS PRESENTED.

The following is a full list of the papers presented to this Section of the conference:

"Illumination by Gas," by Dr. J. S. G. Thomas and Mr. Dean Chandler, of the South Metropolitan Gas Company.

"Use of Town Gas in Industry," by Sir Arthur Duckham, K.C.B., M.Inst.C.E., Past President of the Society of British Gas Industries, and Chairman of the Woodall-Duckham Companies.

"Coke as Fuel for Steam Raising," by Mr. E. W. L. Nicol, M.I.Mar.E., A.M.I.E.E., Assoc.M.Inst.C.E., Engineer and Fuel Expert of the London Coke Committee.

"Fuel Conservation and Smoke Abatement," by Mr. F. W. Goodenough, Controller of Gas Sales of the Gas Light and Coke Company, and Executive Chairman of the British Commercial Gas Association.

"The Co-ordination of Fuel Supplies," by Dr. E. W. Smith, F.I.C., Technical Director of the Woodall-Duckham Companies.

"Low Temperature Carbonization," by Dr. C. H. Lander, M.I.M.E., Assoc.M.Inst.C.E., Director of the Fuel Research Board.

"The Liquid Bye-Products of Coal Carbonization as Sources of Power," by Mr. W. G. Adam, B.A. (Oxon.), Superintendent of the Tar and Ammonia Products Works of the Gas Light and Coke Company.

"Gas-Engines," by Prof. F. W. Burstall, M.A., Birmingham University.

ILLUMINATION BY GAS.

By J. S. G. THOMAS, D.Sc., and D. CHANDLER, of the South Metropolitan Gas Company.

[**Extracted.**]

Though town gas now ministers in so many ways to the communal welfare, it is to be remembered that the genius of Murdoch, "the incomparable mechanic," and of other pioneers was attracted to the subject of the distillation of coal solely by the possibility of utilizing coal gas as an illuminant. The whole of his work was dominated by the thought of the advantages that would accrue from the use of coal gas as a light-giving medium. And in this he was right, for the production of light by the combustion of gas derived from the stored-up sunlight contained in coal is the method most nearly akin of all to natural processes. The complete combustion of coal gas results in the production of water vapour and carbon dioxide, compounds distributed in the air by the respective processes of evaporation and respiration. "Back to the land" was an insistent cry a few years ago. "Back to Nature" in the matter of light should be equally insistent to-day.

In 1806 Murdoch was awarded the Rumford medal of the Royal Society, and in 1808 read before the Society his paper on "The Application of the Illuminating Properties of Carburetted Hydrogen for the Purpose of Furnishing a New and Economical Light." People were slow in their appreciation of the new agency within their grasp, and it is doubtful whether to-day the general public are sufficiently appreciative of the possibilities of gas as a light-giving medium, in much the same way as the cleansing power of soap goes unrecognized at this late time by some members

of the community. As a general rule, extremely important discoveries, though known to many, remain dormant for long periods before they are turned to some useful communal purpose. So it was with Murdoch's discovery of the illuminating power of coal gas; so it is to-day, and possibly so it will remain to the end of time. Can it be truly said that to-day the general public, and more especially the employers and manufacturers of the Empire, are truly appreciative of the benefits accruing from light and still more light? Hardly—if the criterion is the miserably lighted condition of some of our homes, streets, factories, and workshops. In pleading for more adequate lighting of these, we would point out that the advances which have taken place in the manner of utilization of town gas for lighting purposes have rendered lighting by gas extremely economical. Originally, gas was consumed in burners of the batswing or fishtail type. These yielded about one or two candle-hours per cubic foot of gas consumed. Nowadays from 20 to 60 candle-hours may be obtained by the consumption of the same quantity of gas. The bunsen burner, introduced in 1855, was the gift of science, in the person of Professor Bunsen, to the world in general, and to industry in particular. The incandescent gas mantle, introduced in 1885, comprising a hood of textile fabric (silk or ramie) impregnated with a mixture of the oxides of cerium and thorium, we owe to Auer von Welsbach. Important advances in the construction of gas burners have been accompanied within recent years—so far as Great Britain, at least, is concerned—by important advances in the technology of gas manufacture, and by possibly even more important advances in the statutory enactments, embodied in the Gas Regulation Act, 1920, controlling the supply and distribution of town gas.

It is interesting to note the changes which have resulted in recent years from the adoption of improved methods in the art of street illumination by town gas. Considering the streets of South London, for example, it will be seen from the accompanying table that, whereas in the year 1899 these were illuminated with a value equivalent to that afforded by 280,000 candles, in 1902 the figure had increased approximately five-fold with an increase of only about 4 p.ct. in the number of lamps and a decrease of approximately 20 p.ct. in the total annual consumption of gas in the lamps. Greater economies would accompany the complete replacement of upright by inverted incandescent burners, and still greater the use of high-pressure burners.

TABLE 1.

Year.	No. of Public Lamps.	Gas Cons. (Million C.Ft. per Annum).	Equivalent Candle Power.*	Candle-Hours per C.Ft. of Gas Consumed.	Remarks.
1899	20,998	478	280,000	2·5	Flat-flame burners throughout district.
1902	21,800	359	1,270,000*	14·0	Upright incandescent burners throughout district.
1913	24,713	371·5	1,700,000*	19·0	8000 upright burners replaced by inverted incand. burners.

* Based upon a lighting period of 4200 hours per annum.

The following figures serve to indicate the comparative efficiencies realized by gas burners of the flat-flame, upright incandescent, inverted incandescent, and high-pressure inverted incandescent types respectively:

TABLE 2.

Type of Burner.	Efficiency (Candle-Hours per Therm).
Flat flame	360
Upright incandescent	2,700
Low-pressure inverted incandescent	3,600
High-pressure inverted incandescent	10,800

The economy of gas lighting can be regarded in either of two ways; the one relative, the other absolute. First, then, let us look at the matter relatively, and compare the cost of gas lighting by inverted incandescent burners with its competitor—lighting by the so-called "half-watt" lamp, which really consumes 0·7 watt per candle-power. The comparison is set out herewith in tabular form:

TABLE 3.

Low-Pressure Lighting by Inverted Burners.	Electric Lighting by "½-Watt" Electric Lamp.
GAS.	ELECTRICITY.
1 Therm.	1 KW.H. (or Unit).
100,000 B.Th.U.	3420 B.Th.U.
3600 candle-hours.	1428 candle-hours.
2·5	1

That is to say, gas at 2·5d per therm is, for purposes of lighting by low-pressure inverted burners, as economical as lighting by means of the so-called half-watt lamp with electricity costing 1d. per unit. Alternatively, for lighting purposes, gas at 8d. per therm is as economical as electricity at 3½d. per unit.

Let us now attempt to gain an insight into the absolute economy of an adequate system of gas lighting. This we might illustrate by a variety of examples. We will content ourselves with one which we think is appropriate to the occasion of this conference. Suppose we consider a factory provided with an adequate lighting system such that—what is actually considerably in excess of usual requirements—each worker is provided with an inverted incandescent burner furnishing a light value of 75 candles. The respective costs of the installation and operation of the lighting system per worker are then somewhat as follows:

Cost of Installation.

	£	s.	d.
Lamp with enamelled iron corona	0	5	6
Enamelled iron reflector	0	1	10
Silica globe	0	3	4
Cost of piping per point	1	15	0
	£2	5	8

Cost of Operation and Maintenance per Annum.

	£	s.	d.
Interest on investment at 6 p.ct.	0	2	8
Depreciation (10 p.ct.)	0	4	6
Renewal of mantles (three annually)	0	1	6
Cleaning	0	3	4
Gas consumed (based on four hours' lighting per day for 300 days per annum—*i.e.*, total lighting period of 1200 hours)	0	15	0
	£1	7	0

Now let us consider the operative as receiving, say, £3 per week—*i.e.*, £150 or 3000 shillings per annum. Then the cost of operation and maintenance of the lighting installation is met if, due to the adequacy of the lighting, the working efficiency of the workman is increased in the ratio of 27 to 3000—*i.e.*, if the workman saves about one minute per two hours—*i.e.*, about four minutes per working day of eight hours. Similarly the actual cost of the installation is more than recovered in the course of a year if the operative saves seven minutes per working day, and this on the more than adequate basis of an illuminated source equal to 75 candles provided for each operative.

While on this matter of lighting we would enter a plea that the general standard of illumination in factories should be considerably raised from the very low values customary at the present time. Suggested schedules of standards of illumination specified as recommended practice for "fine" and "very fine" work rather than definite and legal minima are contained in the valuable Third Report of the Departmental Committee on Lighting in Factories and Workshops, 1922. [See "JOURNAL," Vol. 159, p. 105.] "For "fine work" it is suggested that the standard of illumination at the working level shall not be less than 3 foot-candles, while in the case of "very fine work" the standard shall not fall below 5 foot-candles. In their First Report ["JOURNAL," Vol. 131, pp. 524, 596, 643, 657, 714], 1915, they recommended that there should be statutory provision requiring adequate and suitable lighting, ranging from 0·1 to 0·4 foot-candle according to circumstances, at floor level over the passage ways, open spaces, yards, and the working areas of workrooms, without prejudice to the illumination required for the work itself. It is of interest to note in this connection that in America the illumination provided in factories in general is considerably in advance of that customary in this country. A valuable schedule of intensities of illumination has been drawn up to serve as a guide for factory owners, &c., and it is interesting to note that the suggested illumination for such commonplace operations as leather working and inspecting raw material required in shoe making, cutting and stitching same, and in textile mills is as high as 20 foot-candles and more. Nor can these suggested standards be regarded as excessive when we remember that the illumination out-of-doors, due to sunlight, may be as much as 4000 foot-candles or higher, and indoors may be as much as 10 p.ct. of this amount or even more.

The possible deleterious and dangerous effects of glare can be very readily, conveniently and efficiently obviated in the case of lighting by incandescent mantles. Let us consider for this point a customary type of lamp of this kind—a "Metro" No. 3 burner. This provides a light source equal to about 75 candles; and as stated in the table, the intrinsic brilliance of the same is about 40 candles per sq.in. To reduce the apparent brilliance of the source to 5 candles per sq.in., as suggested in the Second Report ["JOURNAL," Vol. 155, p. 392] of the Departmental Committee, it is necessary to surround the mantle with a translucent globe having a projected area normal to the line of sight equal to 15 sq.in. Such a globe—of linear dimensions equal to about 4 in. side—is not inconveniently large, and can nowadays be made of the recently-introduced fused silica ware. This material is heat-resisting and unbreakable even when submitted to extreme and rapid variations of temperature. Owing to the fact that the thermal properties of the material permit a closer approach to the mantle than is possible with glass, the actual lighting efficiency of a burner so equipped need be little, if any, less than the actual lighting efficiency of the unprotected mantle.

The hygienic state of the atmosphere is customarily estimated from its carbon-dioxide content. The importance of this criterion has been largely discounted during recent years. The significance of the hygrometric state of the atmosphere, the prevalence or absence of movement, the presence of smell and of disease germs in the atmosphere in this connection, are beginning to be appreciated generally, though medical experts have long insisted upon the importance of these factors. The carbon-dioxide content of the open air does not exceed 0·3 part per 100. In Manchester, the average is 0·4 part per 100, though the total amount due to smoke, &c., amounts to 180,000,000 c.ft. per day. The experi-

ments of Haldane have shown that persons enclosed in chambers containing up to 30 parts of CO_2 per 1000 can still survive and feel no permanent ill-effects—*provided the air is kept circulating*. It is now held that air can be breathed over and over again provided its CO_2 content is kept below 1 part in 1000. It is generally accepted that any system of ventilation which promotes the removal of dust floating in the air and the prevention of a stagnant state of the atmosphere is desirable. Gas is *par excellence* the lighting medium desirable from this point of view. It maintains a hygienic hygrometric state of the atmosphere owing to the water vapour resulting from the combustion, and a brisk circulation of the atmosphere amply adequate to keep the CO_2 content of the air far below that inimical to health is produced. Gas burners were formerly commonly employed in public buildings and halls in such a manner as to afford not only light but also an efficient ventilating system. The renaissance of the system of ventilation by means of "sunlight" gas burners within recent years is gratifying, and has much to commend it.

In the matter of convenience, we regard gas lighting as very little, if at all, inferior to its competitor, electricity. Appliances are nowadays available whereby one or more gas burners can be readily turned on from a distance by means of a switch, which affords the added advantage that regulation by the tap enables the gas to be turned up or down to the extent desired. In the case of electric lighting, such an operation would require the installation of a rather elaborate device.

Finally, we would commend lighting by gas from the point of view of the conservation of the nation's fuel resources, and the recovery of valuable bye-products from the coal employed in rendering such lighting available.

The gas industry is the only industry in which the recovery of these bye-products is practised. Is it too much to suggest that on this account alone all our coal resources should pass through the gateway of the gas-works for prior treatment, preliminary to the recovery of these valuable products and the handing-on of the resulting coke or other fuel to other industries? National well-being suggests that this should be so. Apart from this aspect of the matter altogether, it has been abundantly ascertained that the thermal efficiency of the process of carbonization as practised, day in day out, in our gas-works is extremely high—from 70 to 80 p.ct., compared with the average figure of about 8·5 p.ct. customary in electrical generating stations. From these figures it can readily be shown that, taking into account the respective efficiencies of the various appliances employed, the complete substitution of gas by electricity would result in the consumption of at least twice the quantity of coal in order to meet the needs of the users of light, heat, and power, and would be accompanied by the complete disappearance of the bye-products of the gas-maker's art. Summing up, we recommend illumination by gas on the score of efficiency, health and hygiene, æstheticism, and conservation and most efficient utilization of the country's supplies of raw fuel.

Mr. DEAN CHANDLER introduced this paper, and drew attention to its main points.

There was no discussion.

THE USE OF TOWN GAS IN INDUSTRY.

By Sir ARTHUR DUCKHAM, K.C.B., M.Inst.C.E., Past-President of the Society of British Gas Industries.

[Extracted.]

There is no doubt that gas is the best-known form of fuel for all purposes in industry. For many years the low cost of labour and the apparently high cost of gas have prevented manufacturers from considering its use. Gradually, however, it has been realized that the actual cost of the fuel is not the prime consideration. Gas is easily transported. Labour costs are reduced to an absolute minimum. Any temperatures can be readily obtained and maintained. Heat can be applied just as required to any definite part of a process, with definite intensities varying from the softest to the most intense flame. Combustion can be localized or spread over large surfaces. Oxidizing or reducing conditions can be brought into play at will. As soon as the demand for heat ceases, the fuel supply is shut off; there is no waste.

There are many processes in industry in which gas immediately commends itself as an ideal fuel. In the textile trades, in hat making, boot making, the motor car industry, &c., the cost of fuel is a minor consideration, while convenience, cleanliness, labour saving, evenness and exactitude of temperature, are the factors that count. In such industries the use of gas will rapidly increase, and only publicity is required to convince the potential user. Take next those industries in which the cost of fuel is a more important item, but on which the exactness of application of the heat is of paramount importance. Progressive managers are finding that the use of clean regulatable heat not only possesses the general advantages indicated above, but reduces the amount of wastage. Such processes as melting metals, billet heating, core drying, brazing and welding, baking foodstuffs, &c., all come within this category; and headway is being made. A third class of industries is that in which the cost of fuel is a major item, and the savings effected by the use of gas are limited to labour and transport, saving of space for plant and storage, the non-production of smoke, and the recovery of bye-products. To meet the needs of these industries, gas must be low in price. In large works individual gas-making plants have been installed; but gas making is a technical business, and it has often been found that the gas-making plants give such extra work and responsibility to the management that the benefits are nullified.

We should try to form some idea as to what industry can afford to pay for gas as compared with solid fuel. In the computations I will take the therm as the basis. A ton of ordinary coal has a calorific value equal to 290 therms. Taking the value of coal delivered to a works at 35s. per ton, the cost per therm will be 1·45d. Gas is being sold to-day in large quantities at 4·4d. per therm, or at about three times the price of raw coal. The heating efficiency of the raw coal fire or furnace is not, on the average of cases, greater than 25 p.ct., whereas the heating efficiency of a gas furnace can be taken as 70 p.ct. This improved efficiency gives us a comparative figure of 5·8d. for coal and 6·28d. for gas for every therm actually employed. In other words, coal is under 8 p.ct. less costly than gas as a fuel. This is easily compensated for by the many advantages attached to the use of gas.

If we roughly divide the industrial users of gas into the three classes I have mentioned, then I estimate that it would pay the industries to use gas, in the first case at a price per therm from ten to twenty times that of raw coal per therm; in the second case at a price per therm from five to ten times that of coal; and in the third case at a price per therm from three to six times that of coal.

There are not many instances of gas being supplied at the low price of 4·4d. per therm. The problem is, therefore, how to reduce the price of gas elsewhere. The first way is by increasing consumption. The output of town gas could be increased many times with a resultant lowering in price, if it were used in those cases where a direct financial saving is proved. Publicity is all that is required.

A further necessity is to lower the price of gas by special rates to large consumers. In many instances in this country a sliding-scale exists, and the extension of such an arrangement would undoubtedly result in greatly increased consumption of gas. In America gas is far dearer than in this country, but labour conditions have forced to the front the economics to be attained, and consequently gas is used for the major heating processes in industry even at a price of 1s. and more per therm. Many householders are using gas, at this price and over, continuously for central heating under the conditions of the long winters, and find an over-all saving by so doing.

NATIONAL POLICY.

Throughout our industrial centres there are often large quantities of coal gas from coke ovens going to waste or being used uneconomically. Some broad national scheme should be formulated to make this gas available for distribution. There is a multiplicity of gas undertakings, with the natural increase in overhead charges. A combination of these would result in great economies and the lowering of the price of gas. During the war, the Government realized the necessity for some co-ordination of power supply in order to reduce the cost of electricity, and as an outcome of this the Electricity Commissioners were set up, with resulting benefit to the nation. The Government, however, were timid and not sufficiently far-seeing. A Commission for Heat, Light, and Power should have been instituted, to examine and organize the conservation of our fuel resources and advise as to the best steps to be taken for the benefit of industry from all points of view. Such a Commission could consider and help to fruition schemes for the linking-up of existing supplies, the saving of gas now wasted, the reduction of stand-by plants, and the reduction of overhead expenses.

One of the most fruitful studies for the reduction of manufacturing costs is the co-ordination of gas and electricity supplies. The time will come when practically no raw coal will be consumed. One of three methods will be followed:

1. The gas undertaking may receive and treat the fuel in order to recover the bye-products, and turn over the residue to the electricity undertaking in the form of coke or gas for the generation of electricity by steam or gas engine.
2. The electricity undertaking may first treat the fuel, and turn over to the gas undertaking the gas for distribution, and possibly the other bye-products for further treatment.
3. Coke-ovens may treat the coal, and provide coke and gas to the electricity and gas undertakings.

The closer the producers and the distributors of gas and electricity can work together, the better for the country. Co-ordination is required; and I welcome the World Power Conference as the first occasion in this country when common cause has been made by the two great industries for the common good.

[The paper was followed by an illustrated appendix relating to the use of gas for important trade and industrial processes.]

Sir ARTHUR DUCKHAM, K.C.B., in introducing the paper said: In presenting this paper to you, I am certain that by far the most interesting, and possibly the most useful, part of the paper is the appendix; and I wish first of all to make reference to the latter, because I had practically no part in its preparation. [The appendix referred to numerous industrial applications of gas, and would have made familiar reading in our columns.] The work was done by the British Commercial Gas Association, and

I think they have presented the finest possible collection of descriptions of the use of town gas in the industry of the country to-day. I do not propose to summarize the paper, but would like to take just one or two points and bring them to your notice. It seems to me that one of the most valuable things about this conference is that it has brought together all of us who are interested in power supply; and, of course, in the word "power" one has to include all forms of energy supply, whether in the shape of light or heat, in this and other countries. One of the most striking things to me is that this conference is really the first time that the two great utility interests of this country—gas and electricity—have come together whole-heartedly in conference, and for our country this means a very great deal. In other countries, such as America, you have the gas and electricity undertakings in one public utility company, and it is very interesting for the Britisher, coming from the closest competition between the two industries, to go to America and see them working side by side for the good of the community. Close co-operation is everywhere for the good of the country, and what I look forward to here is this co-operation getting closer and closer.

With regard to my paper, it is a disgrace to our civilization and to our knowledge that so much raw coal to-day is being used in our country for heating. There can be no benefit from using coal as a source of heat in industry. The only possible excuse is its cheapness; and the price of coal is going higher and higher. Gradually it is seen to be an absolutely uneconomical proposition, and naturally if you turn from coal as a source of heat, you must come to gas as an alternative. Gas is produced from coal, and can be produced in modern factories with less waste of the thermal value of the coal than in any other form of energy which could be used for heat. I have tried to show in this paper the many uses to which gas has already been put, and the many more uses that will come along. May I just take one point with which I have been much struck, and it is another point from America? In America you get houses which are centrally heated all through the long cold winters with gas at about 1 dollar per 1000 c.ft., and when you think that people with ordinary incomes, who have to look at dollars as we have to look at shillings here, find it cheaper to use gas for central heating than solid fuel, it must bring home to you the benefits of this method of heating. I do not think I need say more about coal. The cost of transporting the coal and of removing the ashes is so evident that it is almost impossible to conceive how it is people go on using raw coal. I consider that any industrialist who takes the trouble to go into the question thoroughly will find that he could practically eliminate raw coal from his works. Gas as a means of heating, of course, recommends itself by the simplicity with which it can be applied to most purposes. Exact regulation can be automatically secured without labour, by instruments that give just the results which are required.

In conclusion I would emphasize the need for absolute co-ordination of all the fuel interests in the country. We had some time ago a wonderful report on the fuel resources of our country, and from this report came the Electricity Commissioners. Now the Electricity Commissioners have done valuable work for this country, but it is only a very small part of the work that requires to be done in Great Britain, in order that we may regain real industrial prosperity, which depends, for us, entirely on cheap fuel cheaply applied to industry. In the Midlands you find owners of great batteries of coke ovens making blast furnace coke, and selling their gas at 2½d. per 1000 c.ft, and the gas is 500 B.Th.U. If our Chairman could have that 2½d. per 1000 c.ft. of gas supplied to him for the Gas Light and Coke Company, I am certain he would welcome it. Recently, I came across another place where they were selling the gas at 3d. per 1000 c.ft., and this high calorific value gas could be brought into the towns, if only there were some proper co-ordination. If you went round and saw the colossal waste going on all the way through works, I am certain you would agree with me that to-day, if our fuel resources were properly used, we could readily, without undue expenditure of capital, save in this country over 30 p.ct. of the coal used in industry. And yet, who is to take the first step? You see the electricity undertaking, and the gas undertaking, and various other people, trying to get work in order that they may make a profit, but surely what we require is some central body that would look after the fuel used in the country, whatever it might be. It would be a statesmanlike step if we could persuade the Government to take this course. It should have been done when the Electricity Commissioners were created. Day by day, and week by week, the Press are giving publicity to the curse of the smoke nuisance and the curse of waste that is keeping our industry down. Surely the man in the street is at last beginning to understand that something should be done; and presumably when that is so we may get the Government to take steps. Such Heat, Light, and Power Commissioners as I have suggested over and over again for this country could co-ordinate and reduce wastage, and give our country basic cheap forms of energy for the use of industry.

Discussion.

Prof. H. E. Armstrong, F.R.S., said he would like at once to support Sir Arthur's final plea, and urge that this meeting should take some positive action which would bring Government influence to bear on these problems. In a paper which he (the speaker) had presented at one of the conference meetings the previous week, his final paragraph was as follows: "In fine, we need some organization to inform and maintain both public and political opinion on this subject of coal and its treatment. The problems are of extreme urgency, and in need of consideration in all their bearings by Government. They should be submitted without delay to complete discussion by competent minds. We greatly need a body of Fuel Commissioners, whose duty it would be to take cognizance of everything concerning coal, who would be in a position, and competent, to advise on, if not to regulate, scientific and technical inquiry, as well as to criticize, if not to control, those who desire to develop practical schemes. The voice of science must be raised in protest of the continued thoughtless waste of the capital balance funded for us in the far distant past by our great Solar King; nay, it must do more—it must force the hand of ignorance and insist upon attention to counsels of wisdom. It should be our pride to cultivate the garden of solar activity, once created—to cultivate it with jealous care, not to trample, as we ever do, upon its flowers, taking no note of their sweetness and beauty." He would like to make a remark or two with reference to Sir Arthur's main argument. The author referred to the need of applying imagination to this question. He was rather hurt that Sir Arthur's imagination had not got far outside the gas-works. The author said coal would not last much longer. Well, he quite agreed; but what was Sir Arthur's alternative? Gas. That, he took it, was the problem for this meeting to consider. Were they in future to use only gaseous fuel, or were they to use very largely for industrial purposes powdered fuel which had been specially prepared for the purpose? He ventured to think that, marvellous as gas was as a fuel in many ways, much was to be said on many grounds for the use of specially prepared solid fuel. There was an unfortunate Act passed some little time ago which put it in the power of gas companies not to purify gas in the way they did in the past. He thought they had learned that this was an unwise course, but they had not yet reached the point when gas was sufficiently purified. Matters of this kind had to be taken into account, if they were going to make gas a competitor of electricity. The ease of turning on and off had also to be considered. His own view was that gas light, as they had it to-day, was a pleasanter and better light than the electric light. Next he would like to raise the question of bye-products, to which the author referred. The projected processes for treatment of coal otherwise than as it was treated by the gas companies at the present day would involve getting rid of coal tar as they knew it now, and this was a great problem. So far as raw materials for dye manufacture were concerned, he thought they would possibly be able to produce these by more direct methods in the future, and dispense with coal tar for this purpose. But tar was also used for roads, and low-temperature tars had not the properties of ordinary coal tar. One could go on talking for days on this subject.

Mr. David Brownlie said Sir Arthur in his paper took the price of gas as 4·4d. per therm in his comparison. Incidentally, this was a very interesting figure for the 8 million householders who paid about 12d. per therm. Then the author took coal delivered at 35s. per ton; but this seemed very unfair. If they lived where they could buy gas at 4·4d. per therm, a fair price for coal would be not more than 25s. a ton. However, he would take it at 27s. This meant that, for small industrial furnaces, they could buy coal at 1·1d. per therm, and would have to pay 4·4d. per therm for gas, according to the author. He thought it was not worth it. Sir Arthur took the efficiency of the gas-fired furnace at 70 p.ct., and of the coal-fired furnace at 25 p.ct. He (the speaker) very much doubted whether the efficiency of the gas-fire furnace was anything like 70 p.ct. in actual practice; but he would take 60 p.ct., which was fair. With coal at 27s. and an efficiency of 60 p.ct. for the gas-fired furnace, they would be paying for gas approximately five times as much as for coal. He thought Sir Arthur was hardly fair in not allowing for any loss by leakage. One of the big troubles with gas was that it was usually wasted. He should say in an ordinary household 25 p.ct. of the gas was absolutely wasted by people leaving the taps on, and so forth. Gas was easily wasted, and coal was not; and this was a very important thing. [Laughter.] As regards household purposes, he could buy coal for 2d. per therm, and had to pay, he thought, 11d. per therm for gas. The big advantage of gas was its convenience; the disadvantages were that it was poisonous, it leaked, and it increased the fire insurance rates. ("No.") He said it increased the fire insurance rates. He contended that, on the figures quoted, the case was not made out at all. Dealing with the question more from the national point of view, anybody who studied the science of thermal values in this country, as Sir Arthur said, must be struck by the utter chaos of the whole thing, and the enormous waste that was going on. In steam generation in this country enormous quantities of coal were wasted through lack of scientific methods. They did not look at the matter from a co-ordinated point of view; everyone went his own way. As to Dr. Thomas's paper, everybody knew perfectly well that the only reason why 8 million householders did not adopt electric lighting was that they could not get it. [Laughter.]

Sir Dugald Clerk, K.B.E., said he had been much interested in the remarks of Mr. Brownlie. No one had done more work in attempting to increase the efficiency of the steam boiler than he, and he was naturally righteously indignant when his favourite solid fuel was called in question. Personally, he felt that too much organization and too much Government control were apt to stifle the development of other sources of power than the main one dealt with. ["Hear, hear."] In the latest published list of the efficiencies of various electric lighting stations in Britain, among the highest efficiencies were some very small stations run by internal combustion engines on producer gas. The efficiencies of these small stations were practically equal to the efficiency of the best super-station in the kingdom. Thus one could see that there was a certain argument to be advanced for those who desired to manufacture their own electricity. If one considered, for instance, the prices charged for electricity for lighting, it often paid to instal a gas-engine and drive it on town gas—so generating one's own electricity at a cheaper rate than it could be obtained at by taking it direct from the mains. There was no reason whatever why people should not do this; neither was there any reason why small municipalities should not put-in internal combustion engines, which gave the highest thermal efficiencies ever obtained by any engine. This was the fear he had of too much Government control. After all, they were a very individualistic nation. They had to carry out their own work at their own risk, and there was nothing so stimulating as the feeling that, unless one succeeded, the Bankruptcy Court came in. Their existence depended upon being efficient. If they once get

Government control, that was no longer the condition; one might be very inefficient, and yet exist. With regard to Mr. Brownlie's remarks, he appeared not to appreciate one or two things. No one proposed to use coal gas to heat a steam boiler. The highest carbonizing efficiency of a modern gas-works, as Mr. Milne Watson had said, was 88 p.ct. This included the heat value of the coke and tar products, which were both very useful. But if one loaded the coal-gas production with the total heat losses, efficiencies were obtained of 45 to 50 p.ct. In a report by Prof. Smithells, Prof. Cobb, and himself, published some years ago, they were able to show that the average thermal efficiency of the gas production of Britain, calculated in the way he had mentioned, was 46 p.ct.—that was placing the whole of the heat losses to the gas, and counting nothing for the coke or tar. The efficiency of carbonization was 80 to 88 p.ct., but the actual efficiency in production of gas was 45 to 50 p.ct. It could further be raised, and was raised under some conditions, to 60 p.ct. But no one dreamed of heating steam boilers with this. The comparison between gas and coal fires was far different from what Mr. Brownlie supposed. The tested efficiencies of Dr. Fishenden (who had given them some very interesting results) ran to about 20 p.ct. thermal efficiency for the coal fire, under certain conditions and worked properly; but he doubted whether there was any such thermal efficiency of a coal fire in ordinary domestic heating. When one started from cold, there was a period without any radiation. People were careless in putting on coal. Working carefully, no doubt one could get 20 p.ct., but he questioned whether, in practice, there was anything exceeding 10 p.ct. With a good steam boiler, it was an interesting fact that one could get quite as high, or even higher, efficiencies with coke as with ordinary coal. The gas industry was a very highly efficient industry, when one compared it, with its 46 p.ct. thermal efficiency in actual gas production, with the average thermal efficiency of the electricity station in Britain. At the time he made his inquiry, he found that the efficiency of the gas industry was 46 p.ct., and the efficiency of the electricity industry 7·6 p.ct. Gas was enormously superior for all heating purposes as compared with electricity; it was equal in lighting; and it was better than electricity for motive power on a thermal comparison.

Sir ARTHUR DUCKHAM said Prof. Armstrong had stated that his (Sir Arthur's) imagination was centred in the gas-works. He was sorry that he did not know him better. He had been speaking of town gas in industry. He did not think anybody would use solid fuel under a steam boiler if he could get fuel cheap enough in a gaseous form. It was purely a matter of price. This was what they had to get down to. What they desired was the good of the country. This was the feeling he would like to go forward from the conference—that they worked for the well-being of the country, irrespective of whatever niche they might fill in their industries.

FACTORIES AND WORKSHOPS REPORT.

The Chief Inspector of Factories and Workshops (Mr. Gerald Bellhouse) has issued his report for the year 1923, and it is on sale at H.M. Stationery Office, Imperial House, Kingsway, W.C. 2, and branches, at the price of 3s. net. It deals with a period in which trade conditions were again, as a whole, very poor, though better than in the preceding year. Conditions varied a good deal in different industries; but with trade in such an unsettled condition, new developments have been less numerous than usual. Perhaps the most striking, the report says, is the development of large electrical power stations. Other interesting points include the manufacture of synthetic ammonia nitrates, and marked advances have been noted in the reconstruction and extension of coke ovens and bye-product plants. It is remarked that the unfortunate effect of sustained depression in industry on the employment of young persons is mentioned by the Inspectors. Employers seem reluctant to employ young workers who require training, when adults are so easily obtainable; and such a position is very unsatisfactory, as many young people are receiving no industrial training whatever.

The number of registered factories in Great Britain has again increased; the total now standing at 139,920, as against 137,858 for 1922. Workshops declined from 145,684 to 140,850. This decrease in the number of workshops has been going on steadily for a number of years, and is largely due to the introduction of power, which immediately brings the premises under the classification of factories. There has, however, also been a steady closing-down of small workshops, mostly in rural areas; the reduction in the number of persons employed in a favourable environment being considerable in the aggregate. During the year a number of pamphlets were issued, including a second edition of "Lighting in Factories and Workshops"— a welfare pamphlet.

As usual, the report is divided up into a series of chapters by the inspectors having charge of various branches of industry. There was, it seems, during 1923, a considerable increase in the number of accidents reported; the total being 125,551 (including 867 fatal ones), or an increase of 27,565 over the previous year. It is again pointed out that the great bulk of accidents is not caused by machinery, and that only a relatively small proportion can be prevented by mechanical safeguards, which are, however, of the greatest importance. Reduction of the large proportion of accidents not due to machinery can only be accomplished through safety organization within the industries themselves. Reports from various parts of the country as to the growth of the "Safety First" movement are not altogether encouraging, though there are conspicuous examples, chiefly among the bigger firms, to the contrary. Gratifying figures are quoted in the report to demonstrate its success when it is properly organized. In 3 p.ct. of the 2333 accidents due to falls of persons, defective lighting may, in the opinion of the inspectors, have been a contributory cause. Doubtless, it is added, there are many other instances in which defective lighting played a part in the causation, but it is always difficult to decide on the extent. Where, as in engineering and similar works, there are likely to be castings and other loose objects on the floors, proper alleyways should be defined by white painted lines or other means, and these alleyways should be kept clear of all obstructions. The large numbers of accidents due to contact of the worker with the cutting tool, and from various other causes can, says the Chief Inspector, be prevented generally by the exercise of care on the part of the worker, though some of them are due to slipping which might have been avoided by the maintenance of non-slipping flooring, and others by an improved form of lighting which would not cause deep shadows or glare on the lathes. Special attention has been given to accidents in connection with power presses, and efforts have been directed to securing a high standard of fencing throughout the country. As to the Chemical Works Regulations, it is stated that no difficulty has been experienced in securing efficient illumination—in fact, there is rarely any deficiency found. There have been cases of gassing in chemical works during the year, due to carbon monoxide, sulphur dioxide, and chlorine gas; but in no instance was it in consequence of a failure to observe the precautions laid down in the regulations.

From Liverpool there is reported a system of "tallies" adopted by a large firm of tar distillers, which the inspector considers should be more widely adopted, and would prove a safeguard against a man entering a still which has not been inspected. The following are copies of the notice issued to the men, and of the "tally:"

SAFETY FIRST.

NOTICE FOR MEN.

BEFORE ENTERING A STILL:

OBTAIN from the responsible Foreman permission to enter the still by receiving the Special "TALLY" from him.

BE SURE before entering that the Vapour Pipe near the still-head is DISCONNECTED, also that the FOUL GAS PIPE IS COMPLETELY DISCONNECTED from the Receiving Pot attached to the Condenser, and a BLANK is fitted to the disconnected part.

BE SURE the Pitch Pipe is disconnected; also, that the Pitch Cock is open, and that a BLANK flange is bolted on the disconnected pipe.

BE SURE that the front HOT TAR charging pipe is BLANKED off.

DON'T enter a still without the Special "TALLY," it must be returned to the responsible Foreman each night.

DON'T enter a still without being fitted with shoulder straps and someone ALWAYS holding the rope and WATCHING your movements continually.

REMEMBER that the "TALLY" is necessary before you enter not only STILLS, but WASHERS, PRODUCT BOILERS, CONDENSERS, or TRAVELLING TANKS.

WEAR THE SHOULDER STRAPS while you are inside the STILL, WASHER, PRODUCT BOILER, CONDENSER, or TRAVELLING TANK; they are for YOUR SAFETY.

TALLY.

SAFETY FIRST.

Be sure all disconnections are complete.

Don't work in a still, boiler, or travelling tank without shoulder straps.

Return this tally to foreman each night.

Name of Man .....

Still .....

Date .....

PERMISSION TO ENTER.

Signature.....

A large number of applications for exemption was received from various gas undertakings in respect of their sulphate of ammonia and of their tar dehydrating plants. Agreement has been come to with the National Gas Council as to the exemption to be given in the case of the sulphate of ammonia plants, but not for the tar plants. There, it is pointed out, the danger of epitheliomatous ulceration from tar exists, even in small works, and it does not appear to be desirable to relieve the occupiers of such works from their obligations under the regulations to provide suitable bath and washing accommodation. In all, eighteen certificates have been granted during the year, the largest number being to permit the use of public baths instead of providing bath accommodation at the works. The other certificates have been given to meet special conditions which obtain in the individual works, and have been granted only after careful inquiry has shown that the conditions are as safe for the workers as they would have been had the requirements of the regulations been observed.

On the subject of lighting, it is said that, judging by the number and variety of reports, it is quite clear that much more attention is being given by employers to the question of adequate and suitable lighting in a wide range of industries. While it is true that the universal shortening of the working day has reduced materially the time spent at work by artificial light, yet in the winter months the lighting problem is still very important, and from the reports received it is evident that the standard is steadily rising. In engineering shops the system of providing

separate lights for each machine tool is developing. A good many instances of glare, due to improperly arranged or defectively shaded electric lights, have been discovered; but these are gradually being rectified.

In his section of the report Dr. T. M. Legge, C.B.E. (Senior Medical Inspector), said he visited several gas-works to inspect the washing and bath accommodation provided for the men, and "was struck by the evident interest the very competent managers and engineers in this class of works were taking in their provision." He goes on to say that in the four years 1920-23 (excluding eleven cases, with two deaths, in gas-works attributed to pitch) thirteen cases of epitheliomatous ulceration have been reported from gas-works, and fifteen from the manipulation of tar in tar distilleries and the like. Among cases of interest were five of "T.N.T." sickness not involving toxic jaundice. They bear out the view expressed before, that with the disappearance of the extraordinary use of "T.N.T." during the war, the toxic effects in ordinary use would not be great. Five cases, with three deaths, occurred from the cleaning-out of benzole tanks, in the absence of sufficient precautions.

The growing use of compressed air and other gases in connection with manufacturing processes has resulted in a number of accidents. The Departmental Committee on Cylinders for Dissolved Acetylene and the Gas Cylinders Research Committee have already reported that in their opinion only solid-drawn cylinders are suitable for the storage and conveyance of compressed gases. Further as to explosions:

Explosions due to ignition of combustible matter present in compressed air or oxygen constitute a considerable proportion of all explosions of compressed gases, and are almost invariably more disastrous than those due to pressure only. In the case of explosions of parts of compressors and of air receivers, the combustible matter is generally provided by the lubricant used in the compressor. But one explosion, which unfortunately caused the deaths of three persons and injuries to seven others, was caused by coal gas present in a receiver containing compressed air used for starting a gas-engine. The air was pumped into the receiver by the engine when the latter was running with the gas supply cut off, and this was being done when the receiver was burst by a violent explosion. The valve on the gas supply was afterwards found to be leaky, so that the receiver and engine cylinder became charged with an explosive mixture of gas and air; and as the magneto on the engine continued in operation while the engine was running, the mixture was fired in the cylinder, and the ignition was transmitted along the connecting pipe to the receiver. This was constructed with welded joints, which were found to be very defective; but it is doubtful if riveted joints would have withstood the stress imposed by the explosive pressure generated. The use of the gas-engine as a pump for charging the air receiver with compressed air for starting purposes has led to explosions in the past, and has now been abandoned by most gas-engine makers. It is far more satisfactory to instal a small independent air pump or compressor, and so avoid any risk of gas becoming mixed with air in the receiver. If, however, the engine is used as an air pump, some automatic arrangement should be provided for putting the magneto out of action during the pumping operation.

At one of the large London gas-works, at the end of 1922, an explosion occurred in the oil-gas pumping station, which resulted in injuries to 23 men, though fortunately only one case proved fatal. A new turbo-exhauster was being run on trial, with the gas-valves closed, when an explosion occurred which fractured the turbo-casing and the gas-valve. Gas from the main came back through the fractured valve into the casing and engine house, where it formed a mixture with the air which ignited and caused a second, and much heavier, explosion. The first explosion was doubtless due to the ignition of an air-gas mixture in the turbo casing and delivery pipe, but the exact cause of the ignition could not be definitely determined.

Three explosions occurred through the admission of air into coal-gas purifiers. This was due in one case to turning the control valve too far. The air thus admitted set up oxidation of the spent ferric oxide, and so ignited the air-gas mixture. In another case, after breaking through the top tier of oxide in a purifier, it is supposed that one man accidentally caught his pick on the outlet duct, producing a spark which caused an explosion in the second tier. The third explosion was due to the residual air in a fresh purifier, together with back-pressure in the combustion chamber of an experimental retort, causing a fire-back into the main, which resulted in the explosion of two meters.

Several explosions have occurred in connection with the use of coal gas for heating core drying and similar stoves. These explosions have generally been due to the gas-burners becoming extinguished, thus allowing unburnt gas to accumulate in the stove, and then someone opening the stove door while a naked light was in the vicinity. In all such cases, before any attempt is made to re-light the burners or to examine the stove, the gas supply should be cut off, and the stove thoroughly ventilated.

Explosions in connection with producer-gas plants have been responsible for several fatal, and a number of non-fatal, accidents. Here is a case that is quoted:

One of these, which occurred during cleaning operations on a type of plant largely used in gas-works, resulted in the deaths of two men and injuries to two others. This case was entirely due to neglect on the part of the officials concerned to take even the most elementary precautions against fire and explosion. A gas-scrubber full of gas was disconnected from the generator while the latter was opened up for cleaning. A portion of the foul gas main was removed, so that air then diffused into the gas in the scrubber. A workman, who was cleaning out the part of the main still connected to the scrubber, proceeded to examine the interior by means of a lighted candle. The air-gas mixture in the main and in the scrubber was ignited, resulting in a violent explosion. The top of the scrubber was blown off, carrying with it the two men who were working on it. The roof of the scrubber house was also badly damaged. Before cleaning operations commenced, steps should have been taken to clear the plant of gas by thoroughly steaming or ventilating, and a responsible official should have seen that this was done. The use of naked lights on such plants should be prohibited, and necessary examinations should be made with safety electric hand lamps.

During the past two years, the use of acetylene gas has given rise to a number of explosions. The precautions necessary in connection with the use of acetylene are, however, becoming more widely known.

THE CONSETT IRON COMPANY'S SILICA BRICK AND COKE WORKS.

Last Thursday, 140 members of the North of England Institute of Mining and Mechanical Engineers were the guests of the Consett Iron Company, Ltd., and inspected the Company's Silica Brick Works at Templeton Town, and the Fell Coke Works and Bye-Product Plant, Consett. The visitors were welcomed by Mr. A. J. George (the General Manager of the Company), at a luncheon given in St. Aidan's Hall, Blackhill, prior to the inspection. The luncheon was attended by many officials of the Company, including Mr. A. H. Middleton (the Manager of the Brick Works and Fell Coke Works), Mr. R. Alsop (the Secretary), Mr. A. Henderson, Mr. R. Jameson, and Mr. Scholese (Chief Engineer). Among the visitors were Mr. Samuel Hare (the President of the Institute) and Prof. H. Louis (the Secretary).

Mr. George, who presided, said the Company had carried out many improvements. They had provided additional houses, put down the new silica brick and Fell coke plants, and reconstructed the iron making, steel making, and rolling-mill plants. The silica brick and Fell coke plants represented new departures in British and European manufacture. In the brickworks they had the most up-to-date plant in silica brick construction, and in the Fell coke plant they had certainly put up an installation the like of which did not exist in Great Britain or Europe.

The brickworks and coke ovens occupy extensive sites, and are splendidly equipped: the ovens being of the Wilputte type, and the first to be erected in Europe. The Company obtain the ganister and other raw materials required from their quarries, and everything is produced according to strictly scientific methods. The coke ovens have many special features which greatly interested the visitors, among which may be mentioned the charging and discharging of the furnaces by ramming, the rubber belt conveyors, the automatic quenching, the absence of black smoke, the up-to-date plant for the separating and making of benzole, sulphate of ammonia, and tar, and last, but not least, the improved working conditions for the employees.

Mr. Middleton described the silica brick works and coke ovens, which, he said, had aroused interest throughout Europe, and had been inspected, at his own request, by Dr. Endel, of Berlin—a great authority. Dr. Endel had stated that undoubtedly the works were the best equipped in the world, and the materials turned out were the best; but he doubted whether it would be possible, commercially, to put the material on the market. They could put it on the market as a commercial undertaking, Mr. Middleton observed, if people were willing to pay a little more for a good thing, compared with an inferior one. In building the Fell coke ovens, they used 3600 tons of silica bricks. Referring to the advantages of silica bricks for all industries using furnaces of high temperatures, and also to the coke ovens, Mr. Middleton said that exact shapes could be made within 1 p.ct.; the coking time had been reduced from 26 hours to 16 hours 20 min. without any increase in temperature; the yield was the same as by the old plant; the coke was equally as good as any under old conditions; and while, on the whole, the capital cost was about the same, the extra cost of some of the plant was thoroughly justified by the saving of gas and the better and easier working conditions provided, which were greatly appreciated by their workmen.

Mr. Hare proposed a vote of thanks to the Directors, Mr. George, and the other officials, and congratulated the Company on the courage they had shown in spending such huge sums on development schemes during the present difficult times. There were persistent rumours in regard to the nationalization of coal mines, and other industries afterwards; but the Consett Iron Company had shown great pluck in ignoring these rumours, and he hoped they would meet with the reward they deserved.

Prof. Louis said the visit was the best reply that could be made to those who advocated nationalization. Could anyone imagine a Government Department having the courage to take the risks the Consett Iron Company had taken? And would a Government Department have allowed them to walk round and gather the information they had gathered? It was a proud tradition of the North of England coal trade that they did not look upon each other as competitors, but as co-workers; and the Company had lived up to this tradition.

Mr. Middleton mentioned that since the ovens were started fourteen weeks ago they had proved so reliable that the longest stoppage due to slight machinery defects—unavoidable with new plant—had been 4½ hours.

Arrangements have been made to hold the autumn meeting of the Iron and Steel Institute (under the Presidency of Sir William Ellis, G.B.E., D.Eng.) at the British Empire Exhibition, on Thursday and Friday, Sept. 4 and 5.

BRITISH EMPIRE EXHIBITION NOTES.

THE GAS EXHIBIT.

Exceptionally busy has the Gas Exhibit been during the last week or two; and it has within this period been visited by many notable people. The Exhibit was fully inspected on Monday of last week by the Lord Mayor of London (Sir Louis Newton) and his Sheriffs, accompanied by Lord Stevenson, the Chairman of the Exhibition Board. The Lord Mayor displayed much interest in the whole of the Exhibit, and especially in the "Seven Ages of Woman" tableaux. Two members of a large party on Wednesday were Mr. Will Thorne, M.P., and Mr. Arthur Hayday, M.P., on which occasion also there were expressions of appreciation. Other interested visitors have included the members of the City of London Tradesmen's Club and their ladies, who attended in large numbers on Tuesday, the 8th inst.; as already recorded, Lady Rhondda and other well-known members of the Women's Provisional Club, which consists of those engaged in business or professional life; and the American delegates to the World Power Conference and the International Advertising Convention.

There can be no doubt whatever that the Exhibit is sowing widely and bountifully the seed of future prosperity. It is surprising to note the number of people from abroad who apply for lists of various gas-consuming appliances; and this feature has naturally been still more emphasized during the World Power Conference.

RUBBISH DESTRUCTION.

It was pointed out in a recent issue of the "Journal" that one of the big problems of the Exhibition has been to deal with the rubbish. To quote actual figures, 600 people are employed in the early hours of the morning in clearing up the grounds, and as many as 20,000 bins of waste paper have been removed in the course of a single week. Some specially large burners, and a 3 in. gas main to the authorities' incinerator, enable this vast quantity of rubbish to be consumed.

CONTINUOUS TAR DISTILLATION.

At the First World Power Conference there was a good deal of talk about tar, in connection with low-temperature carbonization and the fuel problem generally, and no doubt many of the delegates paused on their way to the conference halls to examine a large model continuous tar distillation plant shown by Messrs. Burt, Boulton, and Haywood, Ltd., of Prince Regent's Tar Distilleries, Silvertown, London, E. As a matter of fact, the firm's technical staff have devised a very simple principle which enables an ordinary battery of tar stills to be converted into a continuous plant. Such a plant, it is said, retains all the advantages of the pot stills, and yet reduces the cost of distillation enormously. The model exhibited represents such a plant, and one that is capable of dealing with from 250 to 300 tons of tar per day of 24 hours. The process is very simple, and by a patent device tar is caused to flow from the first still in the battery through the others in turn. Each still is kept at a predetermined and constant temperature, and the flow of tar remains absolutely constant. From each still, therefore, a product of a definite quality runs continuously. Heat is recovered from the condensers and from a Green's economizer at the base of the smoke stack. Every still is fitted with an indicating thermometer, as well as some type of recording thermometer, which enables complete control to be kept throughout the 24 hours. In practice it is found possible to maintain a 3000-gallon still within 2° or 3° of the required temperature. Samples of the fractions are exhibited. The internal arrangement of the stills makes blowing or frothing almost impossible. Further, it is impossible for a still to empty itself into a neighbouring still, should increased pressure be set up within it. In practice the firm find that there is absolutely no difficulty in making a pitch which keeps within 1° or 2° of the fusing point desired.

"LOPULCO" PULVERIZED COAL SYSTEM.

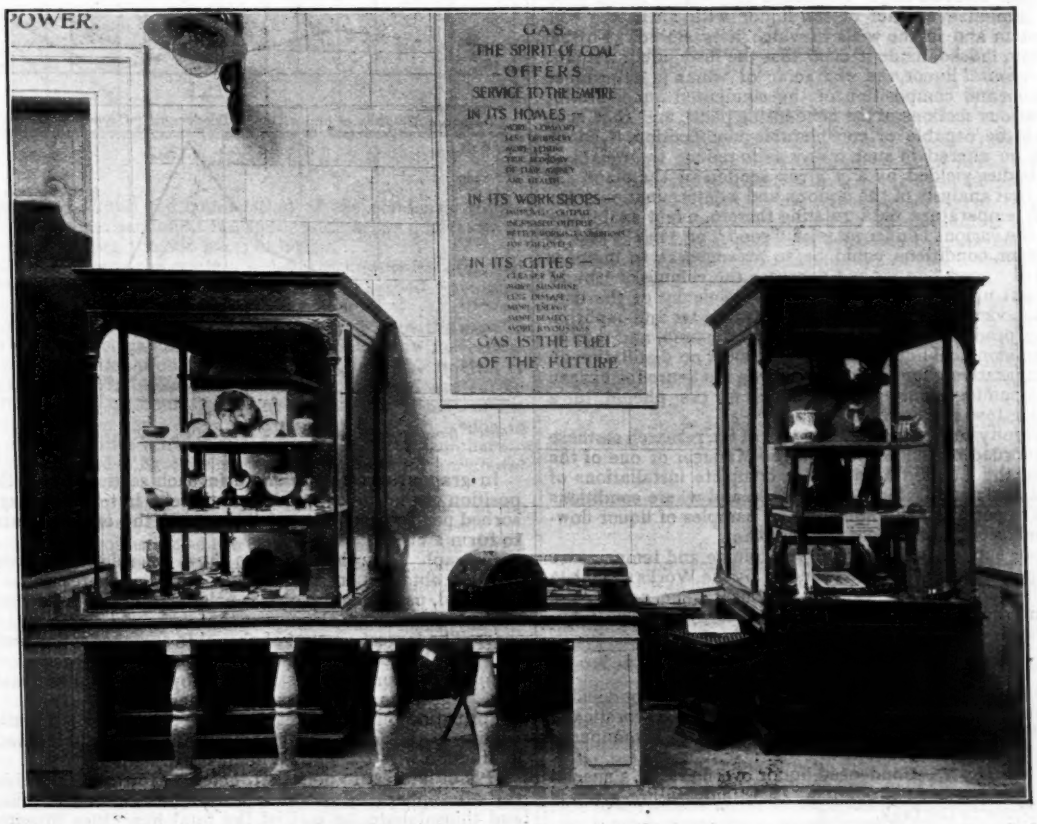
Pulverized coal was mentioned many times in connection with various papers contributed to the World Power Conference, and it is evident that at the present juncture much attention is being paid to proposals of this character. Messrs. Vickers and International Combustion Engineering Company, Ltd., of Vickers House, Broadway, Westminster, S.W., are showing in the Palace of Engineering the "Lopulco" system, in which the coal is pulverized by a Raymond roller pulverizer in a centralized plant.

THE "PAVIC" PUMP.

Reference has already been made to the stand of Messrs. Vickers, Ltd., in the Palace of Engineering. One of the firm's specialities shown here is a pump known as the "Pavic," in which the water is entrapped in the spaces between the square-sided threads of a large screw. The manner in which this is accomplished without allowing the screw itself to travel along in the barrel, is exceedingly ingenious. Demonstrations with actual pumps erected on the stand show that they are suitable to work against high heads and to create large suction pressures. It is thought possible that many uses not even contemplated at present—though their field of service is already recognized as great—may be found for these pumps, for they can deal without trouble with viscous and even grit-charged fluids.

THE THIRD PORT.

"Britain's Third Port"—Kingston-upon-Hull—has during the past fortnight been "at home" in the Civic Hall at the Exhibition, when visitors had their attention drawn to the many advantages the city offers to business people. It has a history dating back hundreds of years, but local enterprise was never at a higher pitch than is the case to-day. Its first Royal Charter was dated April 1, 1299, and by it the borough became the King's town, and was called Kingston-upon-Hull. This name it still retains, though Hull is the name by which it is now generally known.



VIEW OF MORE OF THE HISTORICAL GAS EXHIBITS AT WEMBLEY.

TREATMENT OF EFFLUENT SPENT LIQUORS FROM THE DISTILLATION OF AMMONIACAL LIQUOR.—II.

In Continuation of the Information Given in Reports 1921, 1922—see "JOURNAL," Vol. 159, p. 150, and Vol. 163, p. 256.

[From the Report for 1923 of Dr. T. Lewis Bailey, Chief Inspector under the Alkali Works Regulation Act.]

The situation regarding the disposal of effluent spent liquors from the ammonia distillation process as carried on at gas-works and coke-oven works remains much the same as last year; progress has been made in the laboratory, but the translation of laboratory into works practice is slow.

At the Hornsey Gas-Works the dephenolating towers have been at work throughout the year—with necessary periods of rest when the sulphate of ammonia plant was idle—and continue to deal satisfactorily with all the effluent spent liquor from a 3-ton plant. An experimental tower has been in intermittent operation at works in the Midlands, where vertical-retort liquor is distilled for the manufacture of pure ammonia. At the latter plant special difficulties were encountered at the start. These difficulties have now in great measure been overcome, and the latest results encourage the belief that the method will be successful in reducing the phenol content of the effluent to the desired extent.

Reference was made in last year's report to the erection of an experimental coke filter, charged with matured material, for treatment of the effluent liquor from the dephenolating plant prior to final discharge from the works. During 1923 experimental filters were erected at three works and were in operation for short periods. A small experimental filter was also erected in the laboratory at Cornwall House to test the efficiency of the coke packing under conditions varied with respect to rate of flow and strength of liquor feed (see summary of results below).

Attention was specially directed in 1921 to phenol, as being the most noxious constituent of effluent spent liquors from the ammonia stills, judged by the oxygen absorbed figure. Experience shows, however, that the removal of the bulk of the phenol still leaves in the effluent from the majority of works—and notably from works where liquors from vertical retorts are distilled—an amount of thiocyanate, thiosulphate, and "higher tar acids" (polyhydric phenols, colour-producing bodies) that is sufficient to render the liquors highly objectionable from the point of view of final disposal. Apart from possible treatment on bacterial filters, no suitable method for removal of thiocyanate and thiosulphate from effluent spent liquor has yet been brought into general operation. It was pointed out in the report for 1921 that a reduction of the thiocyanate and thiosulphate content of the feed liquor distilled might be looked for, were it found practicable to minimize contact of the liquor with air in the condensing system and in the wells in which it is stored. Further consideration, indeed, made it clear that the feed liquor actually distilled is a *united* liquor, the character of which is determined by the volume and composition of the condensed liquor flowing from the various sections of the condensing plant, and that such liquor should be capable of considerable modification, if conditions could be altered in such a way as to reduce the weight of oxidizable bodies yielded by any given section of the plant. It was hoped that analysis of the liquors, and a determination of the volume and temperature data relating thereto, might enable one to classify the various condensates as "good" or "bad," and to decide whether conditions could be so arranged as to increase the volume of "good" liquor and decrease the volume of "bad" liquor without undue disturbance of the efficiency of the condensing plant, viewed as a system for removal of tar and naphthalene and the production of a liquor rich in ammonia, and thus to obtain an ammoniacal liquor which would yield on distillation an effluent comparatively innocuous as regards the figure for oxygen absorbed, assuming subsequent removal of the phenol in a dephenolating tower of approved type.

An opportunity for extending the scope of the research on these lines was afforded by the courtesy of the Manager of one of the gas-works in the London area, where complete installations of vertical and horizontal retorts are at work, and where conditions are such as to permit of the collection of samples of liquor flowing from each section of the condensing plant.

The various samples of liquor and the volume and temperature data corresponding thereto were collected by the Works Chemist; the analyses were made at Cornwall House. The results are presented in graphs Nos. 1 to 4; the analytical figures are tabulated in an appendix.

HORIZONTAL RETORT SYSTEMS.

Arrangement of Plant.—The various sections of the condensing plant are numbered 7 to 11; the "united liquor" theoretically obtainable by admixture of the various condensates is numbered 12. Taking the various sections in order:

No. 7. Retort House.—Condensed liquor overflows to a special tank, and a portion is re-circulated. The temperature given is that of the liquor in the tank.

No. 8. Atmospherics.—(1) Two sets of atmospheric condensers, each having a capacity of one million c.ft. and an area of 5030 sq.ft.

(2) Three water-tube condensers, each having a capacity of two million c.ft. and an area of 3000 sq.ft. The temperature of the mixed condensates taken in the seal pot was 49° C.

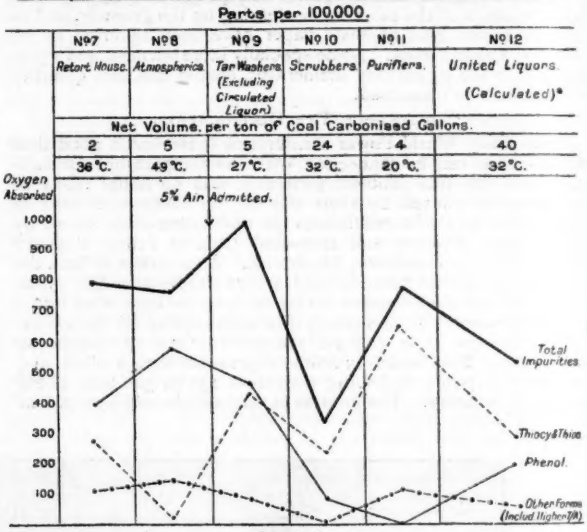
No. 9. Tar Washers (Livesey type).—About 7 gallons of storage liquor per ton of coal carbonized was circulated on this section per 5 gallons of condensate made. Correction is made in the graphs (No. 9 and No. 12) for impurities thus introduced.

No. 10. Scrubbers.—14 to 24 gallons of clean water per ton of coal carbonized are fed on here.

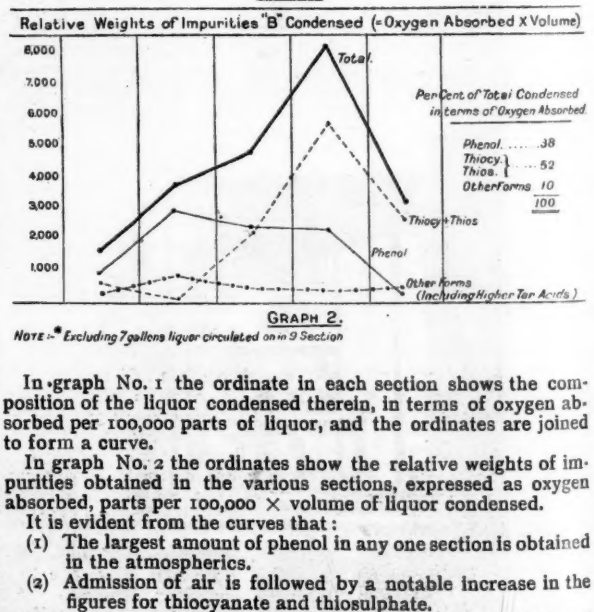
No. 11. Condensate from Purifiers.—This is taken to storage well with the other liquors.

Air estimated at 5 p.c. of the gas made is admitted at the exit from the condensers. Tar and liquor are stored in the same wells, and are separated as far as possible by gravity.

The figures for the complete analyses are presented in the appendix Tables 1 and 2. The constituent bodies in solution are classified as "A" and "B." *Constituents "A"*—ammonia, sulphide and cyanide—are wholly volatile on distillation. *Constituents "B"*—phenol, thiocyanate, thiosulphate, and "higher tar acids"—are either wholly non-volatile in the still or condense in the cooling system with the devil liquor. The character of the effluent spent liquor, therefore, is determined entirely by the amount of constituents "B" present in the feed liquor, and constituents "A" may be excluded from consideration. Results are presented in graphs Nos. 1 and 2.



GRAPH 1.



GRAPH 2.

NOTE:—* Excluding 7 gallons liquor circulated on no 9 Section

In graph No. 1 the ordinate in each section shows the composition of the liquor condensed therein, in terms of oxygen absorbed per 100,000 parts of liquor, and the ordinates are joined to form a curve.

In graph No. 2 the ordinates show the relative weights of impurities obtained in the various sections, expressed as oxygen absorbed, parts per 100,000 × volume of liquor condensed.

It is evident from the curves that:

(1) The largest amount of phenol in any one section is obtained in the atmospherics.

(2) Admission of air is followed by a notable increase in the figures for thiocyanate and thiosulphate.

Formation of thiocyanate in the purifier (11) is attributed mainly to the formation of ammonium polysulphide and to its interaction with cyanide (Williams reaction).

It is of interest to note that the curve for total impurities from the atmospherics onwards closely follows that for thiocyanate and thiosulphate, 52 p.ct. of the total impurities present in the united liquor being attributable to these bodies.

VERTICAL RETORT SYSTEMS.

Arrangement of Plant.—Condensates are numbered 1 to 5; the "united liquor" is No. 6. Taking the various sections in order:

No. 1. Retort House.—There is no hydraulic main.

No. 2. Atmospherics.—(1) One set of atmospheric condensers. Capacity 2¼ million c.ft., and area 9270 sq.ft.

(2) Two water-tube condensers. Each has a capacity of 2¼ million c.ft., and an area of 3540 sq.ft.

No 3. Tar Washers (Livesey type).—About 7 gallons of liquor from the storage well are circulated here per ton of coal carbonized.

No 4. Scrubbers.—10 to 17 gallons of clean water are fed here per ton of coal carbonized.

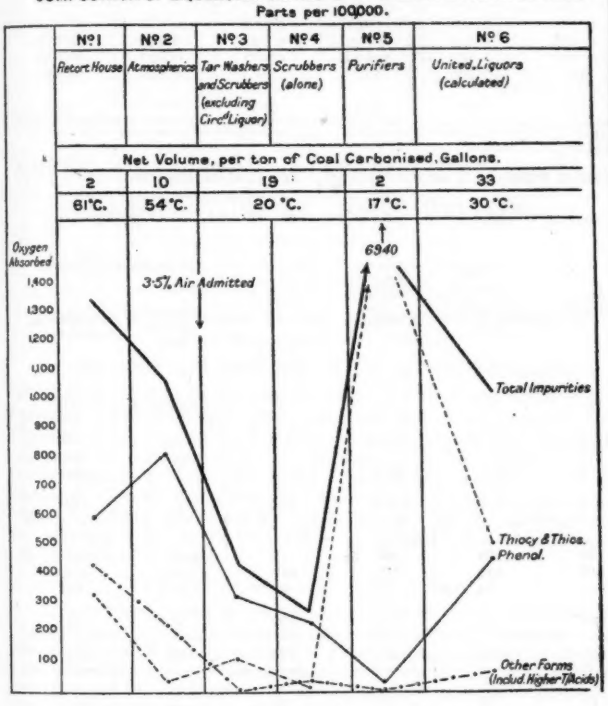
United *total* affluent from Nos. 3 and 4 amounts to 26 gallons, of which 7 gallons is circulated liquor; net effluent, 19 gallons.

Air, estimated at 3·5 p.ct. of the gas made, is admitted at the exit from the condensers. Tar and liquor are stored in the same wells and are separated as far as possible by gravity.

The figures for the complete analyses are presented in the appendix Tables 3 and 4. As already explained, the impurities "B" are alone considered.

VERTICAL RETORTS.

COMPOSITION OF LIQUORS. IMPURITIES "B" IN TERMS OF OXYGEN ABSORBED
Parts per 100,000.



GRAPH 3.

Graph No. 3 shows the composition of the condenser liquor obtained from each section of the condensing system, in terms of oxygen absorbed per 100,000 parts of liquor.

Graph No. 4 shows the relative weights of impurities obtained in the various sections, expressed as oxygen absorbed × volume of liquor condensed.

It becomes at once apparent from a comparison of the results obtained in the two systems that the liquor yielded by the vertical retorts is of exceptional character. If we exclude the amount of thiocyanate and thiosulphate contributed by the condensate from the purifiers (No. 5), calculation shows that nearly 87 p.ct. of the total impurities in the vertical retort liquor No. 6 is due to phenol and impurities other than thiocyanate and thiosulphate—*e.g.*, "higher tar acids," &c.; the corresponding figure for horizontal retorts being 45 p.ct.

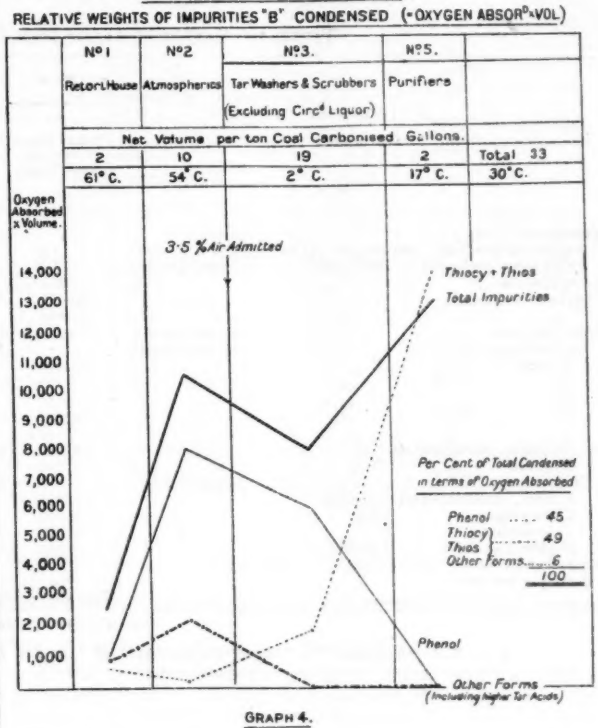
The bulk of the phenols and higher tar acids is obtained in the atmospherics; indeed, the curve for total impurities closely follows that for phenol as far as the exit of the scrubbers, in which the removal of this constituent may be said to be completed.

No absolute figures can be given for the "higher tar acids" (polyhydric phenols—colour-producing bodies) in the liquors under examination. The curves denoted "Other forms (including higher tar acids)," shown in graphs Nos. 1 to 4, correspond to the difference figures obtained when the sum of the oxygen absorption figures, equivalent to the phenol, thiocyanate, and thiosulphate, is subtracted from the total oxygen-absorption figures as determined in the samples from the various sections.

The results of the analyses given in the appendix Tables 1 and 3, sections 1, 2, 7, and 8, indicate to what extent the higher tar acids are contributory factors in the case of the liquors from the individual sections. It should be pointed out, however, that the composition of the liquors 6 and 12 (graphs Nos. 1 and 3) is the theoretical composition calculated for the mixed liquor from

VERTICAL RETORTS.

RELATIVE WEIGHTS OF IMPURITIES "B" CONDENSED (=OXYGEN ABSORBED×VOL)



GRAPH 4.

all sections, and not that of the actual liquor in the storage wells, since further contact with tar brings about additional contamination, as indicated in the following table:

Effect of Contact with Tar in Storage Well.

—	Higher Tar Acids, in Terms of $C_6H_4(OH)_2$. Grammes per 100 c.c.	Other Forms, including Higher Tar Acids, in Terms O_2 Abs., Pts. per 100,000.
Horizontal Retorts: United liq. (No. 12)—		
(*a*) Calcd. composition, as run to well	0·045	56
(*b*) Liquor after storage in contact with tar	0·040	65
Vertical Retorts: United liq. (No. 6)—		
(*a*) Calcd. composition, as run to well	0·225	110
(*b*) Liquor after storage in contact with tar	0·385	330

The figures given in Tables 1 and 3 and graphs Nos. 1 to 4 suggest that the bulk of the higher tar acids in the crude coal-gas leaving the retorts dissolves in the tar vesicles and is removed with the tar separating in the retort-house, and in the atmospheric section of the condensing system. On contact of tar and liquor, a part of the higher tar acids becomes transferred from the tar to the liquor, and this contamination of the liquor is continued in the tar washer and in the storage well.

In view of the effect of admitted air, as indicated in graph No. 2 (horizontals), one would have expected in graph No. 4 a higher production of thiocyanate and thiosulphate in the scrubber section. It may be that the larger amount of polyhydric phenols from the verticals has a selective action as regards oxygen absorption.

[Tables 1, 2, 3, and 4 of the appendix will be found on the following pages.]

(*To be continued.*)

The Bergius Process.

During the recent First World Power Conference at Wembley reference was made to the Bergius process as being developed in Germany. Towards the end of last year, there appeared in the "Iron and Coal Trades Review" a report prepared by experts who had visited works at Mülheim where coal was being liquefied by the Bergius process. Mr. J. E. Bullard, writing in the "American Gas Journal," points out that the process subjects pulverized coal or an artificial coal substance to a high temperature and pressure—for example, 850° Fahr., and 3000 lbs. per square inch—with the result that the solid mass is converted into a thick liquid not unlike crude petroleum. The products from this process consist of a light benzole, a heavy benzole, a light fuel oil, hydrocarbon gases of high heat value, and a heavy fuel oil. Such products as these, he adds, make the process of importance where the supply of petroleum products is less than the demand.

TREATMENT OF EFFLUENT SPENT LIQUORS—APPENDIX.

TABLE 1.—*Samples of Liquor from Condensing System. Horizontal Retorts.*

Oct. 9, 1923.	No. 7. Retort House (Circulated from Tank).	No. 8. Atmospherics.	No. 9. Tar Washers (Circulated from Storage Well).	No. 10. Scrubbers (Fed with Clean Water).	No. 11. Purifiers.	No. 12. United Liquors. Storage Well as Made.	No. 12. United Liquors. Composition Calculated.*
Volume of Liquor—							
Estimated produced, per ton of coal carbonized . Gals.	2	5	5	24	4	not gauged	40
Total from each section (No. 9 includes circulated storage)	2	5	12	24	4	..	47
Temperature . . . . . °C.	36	49	27	32	20	30	32
Character of liquor	Brown, turbid.	Pale straw, clear.	Brown, turbid.	Pale straw, clear.	Brown, turbid.	Yellow, turbid.	..
Composition— Grms. per 100 c.c.	Analysis of liquors leaving the various sections.					Total combined volume 47 gallons.	
Constituents "A"— (wholly volatile)							
Ammonia—Free	0·15	0·82	0·96	1·50	0·14	0·90	1·12
Fixed.	0·42	0·14	0·29	0·11	0·47	0·23	0·20
Total	0·57	0·96	1·25	1·61	0·61	1·13	1·32
Sulphide, calculated as H_2S	0·030	0·113	0·132	0·102	*Nil*	0·116	0·100
Cyanide ,, HCy	0·010	0·032	0·017	0·022	0·004	0·009	0·020
Constituents "B" . . . . . ("Impurities B")							
Phenol, calculated as C_6H_5OH	0·224	0·325	0·204	0·051	0·002	0·162	0·122
Thiocyanate ,, CNS	0·273	0·016	0·295	0·195	0·740	0·240	0·252
Thiosulphate ,, S	0·057	0·011	0·100	0·093	0·026	0·072	0·079
Higher Tar Acids ,, $C_6H_4(OH)_2$	0·070	*Nil*	0·160	*Nil*	*Nil*	0·040	0·045
Oxygen absorbed by "Impurities B" (4 hrs., 27° C.)—							
Parts per 100,000	795	755	770	345	755	610	550

* Includes liquor circulated on No. 9 Section.

TABLE 2.—*Relative Weights of Impurities "B" in the Liquors from the Various Sections. Horizontal Retorts.*

Oct. 9, 1923.	No. 7. Retort House (Circulated from Tank).	No. 8. Atmospherics.	No. 9. Tar Washers (Circulated from Storage Well).	No. 10. Scrubbers (Fed with Clean Water).	No. 11. Purifiers.	No. 12. United Liquors. Storage Well as Made.	No. 12. United Liquors. Composition. Calculated. †
Volume of liquor—							
Total from each section . . . . . Gallons (No. 9 includes circulated storage.)	2	5	12	24	4	Not gauged.	47
Per cent. of total liquor from each section	4·5	10·5	25·5	51	8·5	..	100
Ammonia—per cent. of that obtained, free	0·5	8·0	22·0	68·5	1·0	..	100
,, ,, ,, fixed	9·0	7·0	36·5	28·0	19·5	..	100
Total	2·0	8·0	24·0	62·0	4·0	..	100
Impurities "B"—in terms of oxygen absorbed (4 hrs., 27° C.). Parts per 100,000 :—							
Equivalent to phenol (1·7 × C_6H_5OH)	400	580	365	90	5	290	220
,, thiocyanate (0·827 × CNS)	225	15	245	160	610	195	207
,, thiosulphate (0·856 × S)	50	10	85	80	20	60	67
,, other forms (including higher tar acids) by difference	120	150*	75	15*	120	65	56
Total found	795	755	770	345	755	610	550
Impurities "B"—in terms of oxygen absorbed—							
Per cent. of total for all sections	6	14	36	32	12	..	100

* Higher tar acids, *nil*. † Includes liquor circulated on No. 9 Section.

TABLE 3.—*Samples of Liquor from Condensing System. Vertical Retorts.*

Oct. 9, 1923.	No. 1. Retort House.	No. 2. Atmospherics.	No. 3. Tar Washers and Scrubbers (Tar Washers Fed from Storage).	No. 4. Scrubbers Alone (Fed with Clean Water).	No. 5. Purifiers.	No. 6. United Liquors. Storage Well as Made.	No. 6. United Liquors. Composition Calculated.*
Volume of liquor—							
Estimated produced, per ton of coal carbonized. Gallons	2	10	19	Not measured.	2	Not gauged.	33
Total from each section (No. 3 includes circulated storage)	2	10	26	..	2	..	40
Temperature . . . . . °C.	61	54	20	21	17	35	30
Character of liquor	Brown, clear.	Yellow, clear.	Yellow, clear.	Colourless, clear.	Brown, turbid.	Brown, clear.	..
Composition— Grms. per 100 c.c.	Analysis of liquors leaving the various sections.					Total combined volume, 40 gallons.	
Constituents "A"— (wholly volatile).							
Ammonia—Free	1·45	0·73	2·24	2·11	0·16	1·02	1·72
,, Fixed	0·69	0·14	0·12	0·22	1·76	0·35	0·23
Total	2·14	0·87	2·36	2·33	1·92	1·37	1·95
Sulphide, calculated as H_2S	0·010	0·125	0·285	0·305	0·020	0·080	0·220
Cyanide, ,, ,, HCy	*Nil*	0·020	0·035	0·030	0·020	*Nil*	0·030
Constituents "B" . . . . . (Impurities "B")							
Phenol, calculated as C_6H_5OH	0·334	0·456	0·220	0·128	0·015	0·327	0·275
Thiocyanate ,, ,, CNS	0·311	0·023	0·143	0·010	8·000	0·216	0·514
Thiosulphate ,, ,, S	0·087	0·007	0·017	0·008	0·397	0·045	0·037
Higher tar acids calculated as $C_6H_4(OH)_2$	0·660	0·310	0·175	*Nil*	*Nil*	0·385	0·225
Oxygen absorbed by "Impurities B" (4 hrs., 27° C.)—							
Parts per 100,000.	1350	1060	610	270	6500	1130	1050

* Includes liquor circulated on No. 9 Section.

TABLE 4.—*Relative Weights of "Impurities B" in the Liquors from the Various Sections. Vertical Retorts.*

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	
						United Liquors.	
	Retort House.	Atmospherics.	Tar Washers and Scrubbers. (Tar Washers fed from Storage.)	Scrubbers Alone. (Fed with Clean Water.)	Purifiers.	Storage Well as Made.	Composition Calculated.*
Volume of liquor—							
Total from each section . . . . . gallons (No. 3 includes circulated storage)	2	10	26	Not measured.	2	Not gauged.	40
Per cent. of total liquor from each section.	5	25	65	..	5	..	100
Ammonia.—Per cent. of that obtained. Free	4·0	10·5	85·0	..	0·5	..	100
" " " Fixed	14·5	15·0	33·0	..	37·5	..	100
" " " Total	5·5	11·0	78·5	..	5·0	..	100
Impurities "B" in terms of oxygen absorbed (4 hrs., 27° C.). Parts per 100,000 :—							
Equivalent to phenol (1·78 × C_6H_5OH)	595	810	390	230	25	580	485
" thiocyanate (0·827 × CNS)	255	20	120	8	6600	180	425
" thiosulphate (0·856 × S).	75	5	15	7	340	40	30
" other forms (including higher tar acids) by difference	425	225	85	25	−465	330	110
Total found	1350	1060	610	270	6500	1130	1050
Impurities "B."—In terms of oxygen absorbed—Per cent. of total for all sections	6	25	38	..	31	..	100

* Includes liquor circulated on No. 9 section.

NOTES ON RECENT DEVELOPMENTS OF GAS MANUFACTURE IN GREAT BRITAIN.

By THOMAS GOULDEN, M.Inst.C.E., Past-President of the Institution of Gas Engineers.

[Presented at the Jubilee Meeting of the Société Technique de l'Industrie du Gaz en France.]

Mr. President and gentlemen of the Société Technique de l'Industrie du Gaz en France, I trust you will permit me, before placing before you the communication that I am deputed to deliver, to express the profound appreciation I have of the honour done to my colleagues of the Institution of Gas Engineers by your request to take part in this memorable meeting of your Society. I wish also to record the deep sense I have of the obligation placed upon me by my colleagues of the Institution in entrusting to me the pleasant task which I am about to have the honour of fulfilling.

THE BEGINNING OF A NEW ERA.

At any other time but the present, I should, in speaking to my confrères of the gas industry on recent developments in the manufacture of gas, have been at a considerable loss as to deciding correctly in my own mind what is, or is not, recent. In the present instance, however, this difficulty is non existent, since the Act of Parliament entitled the Gas Regulation Act, 1920, definitely marks the commencement of a new era in the history of gas politics and practice in Great Britain, the conditions of which are in sharp contrast to those which held under previous legislation relating to the conduct of gas undertakings. The application of the provisions of the Gas Regulation Act has so profound an influence on the practice of gas manufacture and supply in Great Britain that it is only fitting, in the consideration of present-day developments of gas manufacture, that this Act of Parliament, which has rightly been termed the "charter of freedom" of our industry, should be the subject of our careful study. I would, however, with your permission, before dealing with the Act itself, and its influence on our industry, consider briefly the conditions immediately antecedent to the promotion in Parliament of the Bill which has been passed into law as the Gas Regulation Act, 1920.

You are probably aware that the main feature of the Act is a radical change in the basis of charging the consumer for gas supplied, requiring any gas undertaking obtaining an Order under the Act "to charge for thermal units supplied in the form of gas," discontinuing altogether the former method of charge on the basis of volume. That the substitution of the charge on the basis of potential heat value for the older method of the basis of charge by volume was logically inevitable, must be evident when it is considered that the general employment of the incandescent burner as the means of obtaining illumination through the agency of gas has brought about the use of the latter solely in regard to its function as an economic fuel, the value of which rests entirely upon the potential heat units of its various constituents contained in unit bulk. It is true that a few luminous burners still continue to be employed, but they are mostly situate in dark passages or underground chambers, where a light is required rather than illumination. The fact that there are exceptions, however, in no way affects the existence of the general rule, which has only reached its full development by slow stages.

CALORIFIC VALUE BASIS.

The advantages belonging to incandescent lighting were so fully recognized in England as far back as 1897 that the Institution of Gas Engineers then awarded a medal to Baron von Welsbach for the important part he took in its first inception; but it was not until 1912 that the British Parliament recognized officially the fact that the luminous flame was a thing of the past. In that year two gas undertakings in the outer London area obtained calorific standards, in each case of 540 B.Th.U. per c.ft.,* corresponding to the 14½ c.p. gas they then supplied. In 1914 the late Sir Corbet Woodall, Governor of the Gas Light and Coke Company, the largest of the three Metropolitan Companies supplying London with gas, also obtained an Act of Parliament, by the provisions of which his Company were absolved from the statutory obligation of supplying gas to an illuminating power standard; this being abolished in favour of a single standard of calorific value, fixed at 540 B.Th.U. gross per c.ft., measured under standard conditions of temperature and atmospheric pressure. The Company were made subject to penalty if the calorific value of the gas supplied fell on any one day below 500 B.Th.U. (gross). It is to be noted that in each case referred to the standard of calorific value was maintained at the full equivalent of the illuminating power hitherto supplied, but already beginning to be regarded as unnecessarily high.

It was not long before the exigencies of the war forced upon the gas industry, as upon the nation at large, the imperative necessity of conserving to the utmost our available supplies of coal. Above all, the demand for benzole and toluole, the raw materials of high explosives necessary to the conduct of operations in the various fields of warfare, and, in addition, the uncertainty of oil supplies from overseas, quickly compelled the setting aside of all the old obligations with respect to illuminating power in favour of a general standard of calorific value which permitted of the extraction of the liquid hydrocarbons required elsewhere than in our gas supply.

The Board of Trade were accordingly given power to grant calorific standards to gas undertakings; that of 500 B.Th.U. being first adopted, eventually to be displaced by an Order for further reduction to 450 B.Th.U. in order that the extraction of raw material for explosives should be as complete as possible. Gas of even lower power was distributed; but in the absence of the suitable adjustment of appliances to so low a grade of gas, the results were by no means entirely satisfactory. Moreover, the attempted manufacture of unduly low grades of gas gave rise to difficulties due to the excessive proportions of incombustible diluents, causing many and well-grounded complaints from the consumers. The experience thus gained in the manufacture and use of gas considerably lower in calorific value than had formerly been permissible was invaluable, indicating as it did the lines on which gas might most advantageously be manufactured for use under the modern conditions of functioning as "gaseous fuel."

REPORT OF THE FUEL RESEARCH BOARD.

Reference has already been made to the necessity, during the war, of conserving the coal supplies of Great Britain. Among the many subjects of national importance, this was not one of the least; and in 1917 the Government of the day, through the Board of Trade, requested a report from the Fuel Research Board of the Department of Scientific and Industrial Research, on the subject of the "quality and composition of gas, and minimum pres-

* 1 B.Th.U. per c.ft. is equal to 8·9 calories per cub.m.

sure of supply, having regard to the desirability of economy in the use of coal, the adequate recovery of bye-products, and the purposes for which gas is now used." The report was presented in January, 1919, and, as presented, formed the basis of the Gas Regulation Act, 1920, enacted during the following year. It is essentially marked by practical common-sense, as may be judged by a few brief references to the substance of its contents.

The Fuel Research Board found that under existing conditions any one general standard of calorific value is neither economically practicable nor desirable, and, granting this, it is assumed that each gas undertaking, from its individual experience, should be best capable of determining the calorific standard best suited to its adoption, having regard to its position in obtaining its raw material, the disposal of its residuals, the manufacturing plant available, and the requirements of its consumers. The Board also made the all-important recommendation that the system of selling gas by volume should be abolished, and that in substitution the charge to the consumer should be on the basis of the actual heat energy supplied. The unit of charge eventually adopted was the therm—that is, 100,000 B.Th.U., equal to (say) 25,190 calories. This method of charge ensures to the consumer that he pays only for the useful ingredients of the gas he consumes, and not for incombustible diluents from which he derives no benefit.

As regards the composition of gas, no recommendation was made in the report except that it should be free from sulphuretted hydrogen, but it was recommended that incombustible diluents should not be allowed to exceed 12 p.ct. It was also recommended that a gas undertaking, on declaring its standard of calorific value, or desiring to change the calorific value of its gas supply, should undertake the adjustment of consumers' appliances for ordinary domestic purposes, so that gas delivered may be used in such appliances with safety and efficiency; and that the pressure of gas at the exit of the consumer's meter should not be less than 2 in. of water.

The Gas Regulation Act.

The foregoing references to the Report of the Fuel Research Board indicate sufficiently its epoch-making nature. The recommendations made were adopted with slight modification, and drafted into the Bill which ultimately passed into law as the Gas Regulation Act.

Under the provisions of this Act, the Board of Trade were empowered to make Orders, on the application of gas undertakings, to modify the standard price per 1000 c.ft. to a price per therm corresponding with the price formerly charged per 1000 c.ft., with such addition as to meet the necessary increase in the costs of production and supply as between the date of Orders made and June, 1914. The financial relief thus offered to gas undertakings was necessary owing to post-war costs having seriously increased, while the calculation of dividends remained on the pre-war basis.

Gas undertakings thus obtaining Orders must conform to the conditions laid down in the remaining clauses of the Act. They are required to: Charge for gas on the basis of thermal units supplied; to give public notice of the calorific value of the gas they intend to supply (which may be altered after due notice); to alter, adjust, or replace the burners in consumer's appliances so that the gas can be burned with safety and efficiency—except in the case of objection by a consumer; and the gas is not to contain any trace of sulphuretted hydrogen, and the pressure is not to be less than 2 in. in a pipe of not less than 2 in. diameter leading to the consumer's meter.

The supply of gas delivered by gas undertakings obtaining Orders under the Act is tested officially under regulations made by three experts appointed by the Board of Trade, and penalties accrue unless default is proved to be due to circumstances outside the control of the gas undertaking. Should the average calorific value of the supply fall short of the declared calorific value in any quarter of a year, a corresponding reduction in price must be made during the following quarter in the case of a local authority, or in the case of a company a deduction from dividend made corresponding with the amount by which the revenue has been improperly increased.

It will be noted that the provisions of the Act take thorough cognizance of the interests of the consumer of gas, while simultaneously financial relief, sadly needed, and freedom in the conduct of production, are offered to the gas industry. It is not surprising, therefore, that the bringing into practical effect of the provisions of the Act of 1920 was generally welcome, despite the usual objection to drastic change, inherent no less in the members of the British gas industry than in the larger public of which they are representative.

It was quickly recognized that important developments in production had become possible which had been out of the question under the older conditions under which gas undertakings had been fettered with all sorts of restrictions. Even in the few cases of gas undertakings given calorific standards of value in the pre-war period, these had been fixed at the equivalent of the abandoned illuminating power standards, thus continuing to stereotyped method of production. Under the new régime, standards of calorific value declared indicate the extreme divergence of view as to what may be most suitable for any single undertaking, as may be judged from the fact that declarations range from 320 to 570 B.Th.U. per c.ft., suggesting "total gasification" in the one case, and the production of high quality "straight" coal gas, as the varying roads to salvation under the respective conditions of the two gas undertakings holding these extreme views. The calorific standard of 320 stands by itself, declarations generally commencing at 400 B.Th.U. In the majority of cases, however, declarations range between 450 and 500, thus securing a power of variation, in method of manufacture and the use of raw material, lacking in the case of undertakings making extreme declarations, whether high or low.

The Past and the Future.

Reviewing the immediate past, one can hardly point out any striking innovation that has been introduced recently into gas practice in Great Britain. The present has developed out of the past in so gradual a manner as to make it difficult to realize that the experience of one year differs materially from that preceding it. The new statutory conditions of production and supply have not yet been in force for sufficient time to develop their full influence on the industry, which may be considered as in a state of flux, in which its individual members are engaged in working out the problem of the economical production of the therm, endeavouring to secure at minimum cost the maximum thermal potential of their raw material, coal.

The problem before us is of considerable magnitude, not likely soon to be solved. It by no means follows that maximum thermal efficiency actually spells the lowest cost of production. Maximum thermal efficiency may be, and is, in a large number of cases, only to be obtained at too great cost in the scrapping of plant and appliances which even now serve their purpose at high, though possibly not at the highest, efficiency, which it would be wasteful economically to replace by the most modern plant, involving high initial outlay in the cost of erection. Take, for instance, the horizontal retort, which was threatened some years back by the "inclined" retort, and for which during the last few years vertical retorts have been largely substituted. That this system of carbonization, the horizontal—and in smaller degree the inclined retort—is still capable of highly efficient work is emphasized sufficiently by the fact that horizontal retorts continue to be largely employed in the manufacture of gas by the three great Metropolitan gas undertakings supplying the bulk of the London area. Two of these, the South Metropolitan Gas Company and the Commercial Company, conduct the whole of their carbonization of coal in horizontal retorts, while the third, the Gas Light and Coke Company, use horizontal retorts exclusively at their principal works, Beckton, and in large measure at their other manufacturing stations. A few inclined retorts are also used, and continue to work in a most efficient manner, and at two of the Gas Light works vertical retorts are also in operation, and their use is being extended. The South Metropolitan standard of calorific value is high (560 B.Th.U.) due to the practice of confining production to that of high-quality coal gas alone, of exceptional purity and freedom from incombustible diluents. Both the Gas Light and Coke Company and the Commercial Company distribute coal gas diluted with lightly carburetted water gas, working to the declared standards of 500 and 475 B.Th.U. respectively. The efficiency at which all three Companies conduct their carbonization of coal is high; last year's working showing a production of gas per ton of coal carbonized ranging from 70 to 72 therms in heat content, mainly from Durham coal, of which by no means all was of first-class quality.

There can be little doubt that the valuation of gas in terms of heat content will conduce to general improvement in the carbonization of coal as now followed by these three Companies—viz., producing coal gas of comparatively high value, and as free as possible from incombustible diluents.

The need for thoroughly sound retorts, built of material suited to withstand the increased temperature of carbonization, the due relation of the charge of coal to the size of the retort, and generally increased attention to the details of retort-house work, are becoming more generally recognized throughout the industry; and I would take this opportunity of expressing our indebtedness to Mr. E. V. Evans, of the South Metropolitan Gas Company, for his very interesting and instructive series of lantern lectures given recently at the Society of Arts on this subject.

In their report preceding recent gas legislation, the Fuel Research Board made reference to the prevailing view appearing to be that elasticity in manufacture can best be secured by the fixing of a sufficiently low calorific standard. This is undoubtedly so, for an undertaking manufacturing coal gas alone can only conduct its carbonization at maximum thermal efficiency by producing gas of high quality from the particular coal it elects to use. Moreover, economy in the use of coal, the desirability of which formed part of the reference to the Fuel Research Board in its instruction to report, is necessarily less than when a relatively low standard of calorific value permits of the gasification, either in vertical retorts or in water-gas plant, of a portion of the coke produced in the process of carbonization.

Vertical Retorting.

To gain the desirable elasticity referred to as a means of securing economy in the use of coal, the production of water gas, mostly lightly carburetted, and the carbonization of coal in vertical retorts in which water gas is produced simultaneously are increasingly resorted to. So long as the standard of calorific value was maintained at the equivalent of the former illuminating power, the vertical retort was heavily handicapped; but with the freedom permitted by the Act of 1920 to lower the standard of calorific value, the full advantage of the vertical retort was

brought into the region of practical politics. This is well shown by the following extract from the report of the Fuel Research Board published in 1921, giving results of experimental operations at the Fuel Research Station.

Gas made per ton of coal (therms)	71·26 ..	95·68 ..	103·8
Output per retort per day ,,	179·6 ..	244·9 ..	257·4
Steam percentage of coal carbonized	*Nil* ..	12·44 ..	20·53
Percentage of coke produced	72·3 ..	66·5 ..	66·2
Calorific value of gas (B.Th.U. gross per c.ft.)	544 ..	477 ..	460·0

These figures are indicative of the elasticity of manufacture belonging to the use of the vertical retort, and are illustrative of general experience in their operation. The increase of 32½ therms per ton of coal is a large step in coal economy, and is effected at the expenditure of 8·4 p.ct. of the residual coke, *plus* the fuel expended in the production of steam. There is also an important increase in the production of "therms" per retort. As an example of actual working during a period of six months, the following figures relating to a gas undertaking in the North of England, published recently, are interesting. These are:

Gas made per ton of coal	19,000 c.ft.
Therms ,, ,,	85·7
Coke and breeze made for sale, per ton of coal	10·0 cwt.
Sulphate of ammonia	30·2 lbs.
Tar	17·2 gallons
Calorific value of gas (B.Th.U. per c.ft.)	450

The above figures indicate a gas production efficiency approximating to 61 p.ct.—a very considerable advance on average pre-war practice. Sir Dugald Clerk, in 1919, quoted the thermal efficiency of gas production in the case of an important gas undertaking in the Midlands district as 57·4 p.ct.; carbonization being effected in horizontal retorts. This, however, was a particularly high figure, the average being much nearer to, or even slightly less than, 50 p.ct. It is little to be wondered at, then, that the adoption of medium calorific standards of (say) 450 to 500 B.Th.U., has been the rule, and that values outside this range are the exception.

The increasing attention that is given to the abolition of the smoke nuisance in the larger towns of Great Britain is a strong factor also tending to the adoption of gas production in vertical retorts. So far as information at hand is available, vertical retorts already erected and in course of erection in Great Britain are now equal to the carbonization of nearly 23,000 tons of coal per day, or (say) from 4½ to 5 million tons per annum; the total annual consumption in gas-works as recently as 1922 approximating to 16,000,000 tons. When it is considered that of the annual consumption of coal by the three Metropolitan Companies (about 3½ millions of tons) not more than 150,000 tons are carbonized in vertical retorts, the extent to which this form of carbonizing plant has been adopted is nothing less than remarkable.

Waste-Heat Boilers.

The weak spot in the operation of the vertical retort setting is the high temperature at which the waste gases, after heating the retorts, are rejected. This was early recognized, and a part of the waste heat was used to produce steam wherewith to feed the retorts, by the use of boilers attached singly to each setting. More recently, however, the heat of the waste gases has been much more effectively used by the installation of boilers of larger capacity erected independently of the settings, through which the waste gases pass by induced draught. This type of plant is comparatively economical to instal and is thoroughly effective in carrying out the purpose it is intended to fulfil. As an example, among others now in successful operation reference may be made to the results obtained at the Stratford Works of the Gas Light and Coke Company, where two "Kirke" firetube waste-heat boilers have been installed in connection with ten settings of vertical retorts carbonizing 240 tons of coal per day. For the purpose of dealing with the waste gases, the settings are divided into two groups, each five in number, to which is allotted one boiler. The waste gases pass into a common collecting main, from which they are drawn through the boilers by the induced draught of a rotary fan, from the outlet of which they are discharged into the atmosphere. The greatest care has been taken, by lining and jacketting all mains and pipes, to prevent loss of heat by radiation. With regard to working results, the claim made of producing rather more than 5 lbs. of steam at 115 lbs. pressure, by means of the waste gases, per pound of dry fuel into the producers, has been the subject of some discussion; but the fact is indisputable that the steam produced is in sufficient quantity to permit "letting down" all the boilers usually employed except those allocated to the water-gas plant.

During the period of testing, on the results of which Mr. J. S. Thorman, the Engineer of the Stratford Works, based a paper he recently read in London, the quantity of coke fed to the producers is stated to have been 14·95 lbs. per 100 lbs. of coal carbonized in the retorts. The temperature of the waste gases leaving the settings was 900° C., reduced at the outlet of the boilers to 225° C. Steam to the extent of 15 p.ct. of the coal carbonized was fed into the retorts. The net result is the releasing for sale to the public of an additional quantity of fuel equal to not less than 5 p.ct. of the original thermal value of the coal. The success of the arrangement is obvious, and is due in large measure to the adoption of induced draught, permitting of the reduction to a comparatively low temperature of the cooled gases leaving the boilers used as heat exchangers.

The important saving of fuel thus effected by the utilization of the waste heat of vertical retorts has directed attention to the possibility of similarly treating the waste heat from horizontal settings, which tends to increase owing to the greater temperature at which carbonization is now conducted. The conditions are not so favourable as in the case of vertical retorts, but calculations indicate that upwards of 2½ lbs. of steam should be produced per pound of producer fuel, the temperature of the waste gases at the outlet of the regenerator being 750° C. It is of interest to know that such an installation has been contracted for, to be fitted in a large retort-house in an important London works, not only for securing the economy it is expected to realize, but in order to obtain information which will be placed at the disposal of the industry.

Fuel Conservation in Water-Gas Plants.

The question of fuel conservation in water-gas plant used in the gas-works of Britain has also of late years been the subject of serious attention. The saving in fuel consumption consequent on the utilization of the usually wasted "sensible" heat of both "blow" gases and water gas has been found to be material. Mr. E. G. Stewart, in a paper read in London in 1920, claimed that by the use of a waste-heat boiler attached to blue water-gas plant the over-all thermal efficiency of production was raised from a little more than 50 p.ct. to 70 p.ct. The type of plant usually employed in British gas-works is, however, installed for the purpose of producing carburetted water gas, and as such is not so readily suitable to the economical adoption of waste-heat boilers, since in order to obtain maximum thermal economy separate boilers must be fitted—one functioning with the blow gases, the other with the carburetted water gas containing tarry vapours. The high initial expense of the double installation of boilers, as well as the difficulties in operation arising from the deposition of carbon and tar in the interior of the boiler through which the carburetted water gas travels, has militated against the adoption of this arrangement. It has been proved, however, that substantial economy is to be effected by the installation of one boiler only, used solely for the purpose of extracting the heat of the blow gases for the production of steam. The saving in fuel thus effected is considerably less than in the case of the waste-heat boiler attached to blue water-gas plant, since the boiler functions only during the blow period. Despite this handicap, we find by experience that a saving in boiler fuel equal to 12 lbs. of breeze, or (say) 8 lbs. of coke, per 1000 c.ft. of gas produced is effected. The arrangement of plant is probably well known to all here, so that it will not be necessary more than briefly to describe it as essentially consisting of a water drum, or boiler proper, placed at a slight inclination from the perpendicular, with top and bottom chambers connected by tubes of about 3 in. diameter, through which the hot blow gases pass before reaching the stack valve. A steam drum is fitted by a short connection to the upper part of the boiler, on which the usual boiler fittings are fixed and from which the exit steam pipe is taken.

A further means of fuel conservation in water-gas plant, as well as of the avoidance of the extremely arduous work of clinkering the generator fires by manual labour, has, like the waste-heat boiler, been recently introduced by the well-known firm of Messrs. Humphreys and Glasgow. Hitherto, success in the mechanical clinkering of gas generator fires has not been attained, owing to the adhesion of clinkers to the heated firebrick lining of the generator. The firebrick lining is now done away with, being replaced by an inner steel lining to the generator casing, made steam tight, in which water is circulated, keeping the interior plates next to the hot fuel comparatively cool. Under this condition there is no longer any adhesion of the clinker to the generator wall, and it moves downwards readily to be disintegrated by the revolving grate below. In addition to the saving of labour, about 30 lbs. of water are evaporated per 1000 c.ft. of gas produced—enough to make the generator self-supporting so far as its steam consumption is concerned.

The importance of developing to the utmost the economical operation of water-gas plant may be judged from the extent to which this method of manufacture is employed. Official returns for 1922 state the make of water gas in Great Britain to have been 43,946 million c.ft., coal gas during the same period being 201,903 millions. The coke consumed in the manufacture of water gas amounted to over a million tons; and, due to the manufacture of water gas, 2½ million tons of coal were available elsewhere for the use of the nation, which otherwise would have been consumed in gas-works.

The facility with which the calorific value of gas may be varied in carburetted water-gas plant gives the latter a much added value since the introduction of the altered basis of charge to the consumer, for variations in the quality of the coal gas, the production of which does not so readily lend itself to the maintenance of an even standard of value, may be readily corrected by the use of a little less or a little more oil in the water-gas portion of the works. The only remaining reference to water gas that need be made here is as to its value during periods of shortage of coal, which, unhappily, have of late been all too frequent. With a reasonable coke stock and a sufficient supply of oil, the producer of gas may consider a temporary coal shortage with equanimity; while the consumer may rely upon the reasonable continuance of his supply without diminution of heat content.

COMPLETE GASIFICATION.

The adoption of the Gas Regulation Act has naturally encouraged the practical application of methods of carbonization which otherwise could only have been possible to an exceedingly limited extent. At present, the most important of these is undoubtedly that of the total gasification of coal. A number of gas undertakings, generally of small size, are situate in rural districts where both the disposal of residuals and the cost and difficulty of obtaining coal are the subject of considerable anxiety. To such undertakings total gasification must offer a very great attraction, as well as to the large number of engineers who are interested in the investigation of the problem of economically producing increased gaseous thermal potential from the raw material of the industry. That total gasification is a practical proposition, under suitable conditions, is sufficiently evidenced by the extent to which this process of gas production has been already adopted. So far as information is obtainable, plant erected, or in course of erection, in Great Britain, is now equal to the production of about 35 million c.ft. per day. Unfortunately, the calorific value of the gas is low, not usually exceeding 360 B.Th.U.; but this is capable of increase by the use of oil in a carburettor, as in the case of water-gas plant. The proportion of carbon monoxide is also high—rather more than 30 p.ct.—marking it as a gas suited to act as a diluent of ordinary coal gas rather than for distribution without admixture. Popular opinion is distinctly opposed to the supply of gas containing unduly high proportions of carbon monoxide, and would undoubtedly take steps to enforce restrictive legislation were the distribution of such gas attempted on an important scale.

Accurate statistics as to gas production by this process have been obtained by the courtesy of a well-known engineer in the Midlands district, the excellence of whose practice and whose reliability of statement make the following quoted results especially valuable. A period of twelve months' operation of a total gasification plant under his direction showed an average result obtained of 161 therms per ton of coal gasified—*i.e.*, 47,411 c.ft. of 339 B.Th.U. The best monthly average showed gas production equal to 191 therms per ton of coal. From this and from other reliable sources the gas production efficiency of this process appears to be about, but not exceeding, 60 p.ct., and viewed from this point, it is economical in respect of coal consumption. From the point of view of the whole carbonization process, it does not appear to equal advantage, for in the absence of residuals, the gaseous thermal efficiency is also the total process efficiency, whereas by the ordinary methods of gas production in either horizontal or vertical retorts, all-round efficiency approximating to 80 p.ct. is the rule rather than the exception. Beyond this latter is the value of the ammonia, not taken into account in the calculation of thermal efficiency.

LOW-TEMPERATURE CARBONIZATION.

Before concluding these notes on present-day developments of gas manufacture, it will be well to refer briefly to the process known as the low-temperature carbonization of coal. This, in spite of having been before us for many years past, has never been taken up by the gas industry, being primarily not a gas-production process, but one having for its object the production of a domestic smokeless fuel possessing more volatile matter than does the ordinary gas-works coke, and in addition to this the production of a largely increased quantity of tar and tar oils. The general adoption of this process would involve the consumption of a largely increased quantity of coal compared with that now used, for the production of equivalent thermal potential—giving rise to a position with which the management of few undertakings would care to be faced. It is possible that in a few isolated instances gas undertakings may profitably purchase the rich coal gas produced by low-temperature carbonization plant installed in their immediate vicinity, for admixture either with water gas or gas produced by the process of total gasification in their own works, but beyond this the normal gas undertaking and low-temperature carbonization are not likely, under existing conditions, to be more closely allied.

The notes which have been presented to this meeting have been compiled with the view of bringing to the notice of members of the Société Technique de l'Industrie du Gaz—first, a general idea of the main provisions of the Gas Regulation Act, 1920, which we are convinced will prove of lasting benefit to both producers and consumers of gas, and, secondly, to give some general idea of the present-day conduct of gas manufacture in Great Britain, as developing out of the application of the provisions of the Act. It is evident that considerable time must elapse before the gas industry settles down to operation under the new conditions created by the Act; and the several roads which have been indicated as the routes by which our colleagues are endeavouring to attain the goal of cheap gas are illustrative of the variety of opinion as to how success is most likely to be attained. The Act of 1920 permits of the widest possible scope in methods of manufacture, and it is this that constitutes its particular value, disregarding its financial provisions, enabling us to vary promptly our procedure in accordance with the prevailing conditions of the time making for economical production. This, I take it, we all recognize as the common aim in the application of that great and irreplaceable asset of nature, coal, to the needs and comforts of the communities it is the gas industry's privilege to serve.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

—"as ithers see us."

SIR,—There is, I believe, a general understanding among the Press by which the courtesy is mutually accorded of quoting freely from contemporary issues. I do not know whether this permission would extend to the reproduction in the "GAS JOURNAL" of five whole columns and three illustrations from another publication. But even if a fee or royalty were required, some effort should be made to enshrine in the bound volumes of the "JOURNAL" so delightful a commentary on the exhibit of the Gas Industry at Wembley as the one I have in mind—remembering, of course, that we require an occasional dose of propaganda among ourselves in addition to the larger quantities we recommend to the general public, and that some of us must have had grandmothers, or at least mothers, who found it necessary to adopt an attitude, if not on all fours, at least of devotion, in an endeavour to control, and not less certainly to obtain, the passage of a current of gas to the fires in their bedrooms or sitting rooms, as the case may happen to be, through a valve or tap either sunk below the level of the floor, or, in some instances, resting not less inconveniently upon it.

Indeed, had I any authoritative, or at any rate advisory, responsibility (by which I do not, of course, mean an association merely complimentary) in the work of the Committee responsible for the exhibit, I would make a strong endeavour to obtain permission to reproduce the commentary in the form of one of those alluring little brochures which are the delight of the small people of both sexes, who enjoy the acquisition of such "literature" perhaps in the same way as they hanker after the collection of cigarette pictures, and which would attract at the same time the attention of the general public—especially if some such title were provided on the cover as "The Thousand and Second Use of Gas"—leading them by its perusal to an appreciation of the fact that, in addition to the many other qualities with which it is endowed, town gas can also be depended upon to increase our supply of "heart easing mirth."

CHARLES CARPENTER,
per A.S.H.

South Metropolitan Gas Company,
709, Old Kent Road, S.E. 15. July 14, 1924.

P.S.—In case the subject of my suggestion may have been overlooked by the Intelligence Department of the British Commercial Gas Association, perhaps I ought to add that my reference is to pp. 34 and 35 of the current number of "Punch."

The Mechanism of the Water-Gas Process.

SIR,—I shall be obliged if you will allow me the opportunity of continuing the discussion with Prof. Cobb on the mechanism of the water-gas process.

Prof. Cobb bases his reply to my criticism of his explanation of the changes taking place during the run upon the statement that the "highest figure experimentally determined" by Hahn for the water-gas equilibrium constant at 1405° C. was 2·45. This is a statement of fact; but since Hahn's work was carried out, a mass of evidence, experimental and theoretical, has led to the conclusion that the true value of the constant at 1400° C. is about 3·55. This exhibits a very considerable difference; and as I have never suggested that equilibrium is definitely established, but only closely approached, in the zone of highest temperature in the fuel bed of water-gas plants, reference to the experimental values for the ratio $\frac{P_{CO} \times P_{H_2O}}{P_{CO_2} \times P_{H_2}}$, in the large-scale experiments in which the conditions approached most closely to the "normal," will indicate that the results confirm my contention. They are:

Experiment.	$\frac{P_{CO} \times P_{H_2O}}{P_{CO_2} \times P_{H_2}}$
Report VI., average	4·0
Report X., C	3·5
Report X., D	4·2

That the water-gas equilibrium freezes at the higher temperatures, and is not reversed in the presence of the ash-free coke at lower temperatures, is supported by the experiment described in the discussion on Mr. Lane's paper. It is also supported by the analogous case of the freezing of the $CO_2 : C : CO$ equilibrium in the gas producer. If one refuses to admit that the latter reaction freezes, one is driven back to the unreasonable conclusion that this reaction can proceed more rapidly in one direction than in the other under identical conditions.

The Report does not really bring out the point which I wished to make, which is that I do not think that one is justified in drawing conclusions as to the mechanism of the water-gas process from the results of experiments carried out at temperatures below 1000° C. There is a real need for experimental work at temperatures corresponding to water-gas practice; but we do not actually know what the limits of these temperatures are. I gather from Prof. Cobb's note that he assumes that the average of the upper limit of temperature lies in the neighbourhood of 1400° C. I have generally assumed that this is the case, though there is no direct evidence to go upon, and one can only base a guess upon the results of experiments with continuously-blown furnaces. I do not think that it is safe to draw conclusions from observations on the form of the clinker and slag in the fuel bed, for these do not appear to me to do more than show that the temperature gradient in the bottom part of the fuel bed is very steep. We require actual experimental results to enlighten us in this matter. However, that such information is not available is no fault of Prof. Cobb and his associates, to whom we owe so much of our knowledge of the water-gas process.

M. W. TRAVERS.

147, *Queen Victoria Street, E.C.* 4.
July 8, 1924.

The Regenerative Coal Gasification System.

SIR,—Twenty-five years ago a certain Paul Naef, Doctor of Physics, Chemical Engineer, of 165th Street, New York, sought and obtained patents in various countries, including Great Britain, for a novel process of what is now termed complete gasification. The patent in this country is No. 20,659, October, 1899.

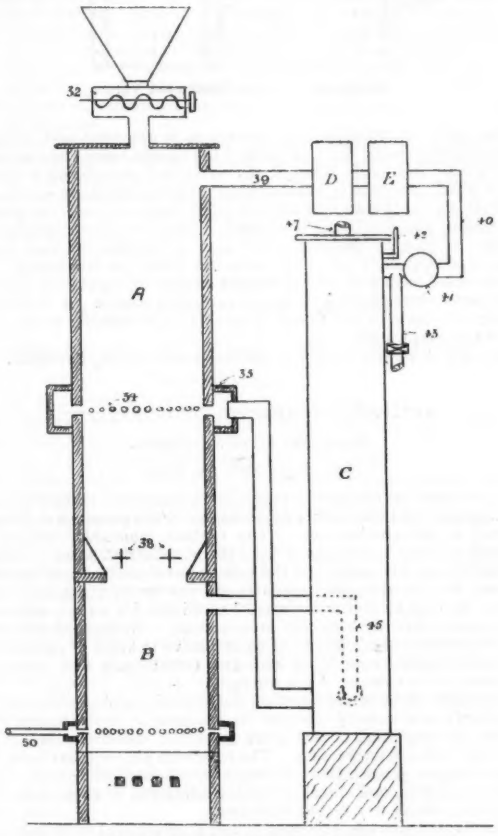
If Paul Naef is still living, and could have attended the recent gathering of the Institution of Gas Engineers, he would doubtless have been surprised to hear a paper read on practically his own line of work by Mr. A. G. Lane—the plant he has adopted having been introduced by Messrs. Travers and Clark, who believe they are the originators of a new process of coal gasification, but which it seems to me was anteceded by the work and patents of Paul Naef.

Glancing at Paul Naef's specification, what did he claim, and how did he propose to carry out his claims? In the preamble of the specification, he states:

> "The process consists in heating a mixture of water gas or other combustible gases, containing no nitrogen, and steam to a high temperature and conducting the highly heated mixture through a column of coal."

The claims in the specification number forty-five, and are amplifications of the fundamental claim.

Then Naef proceeds to describe the apparatus, and I have made a true copy of the diagram (fig. 2) in the specification. Now if this diagram is compared with the published diagrams of the Travers-Clark plant and Mr. Lane's explanation and working of the same, it seems to me from my reading of the specification that they are as like as two peas.



Naef's Regenerative Gasification.

A. Coal container.
B. Water-gas generator.
C. Gas-heater (generator).
D. Gas-cooler.
E. Gas-washer.
32. Coal-feed.
34. Ducts for entrance of hot gas and steam from C.
35. Annular duct channel.
39. Gas outlet-pipe to cooler and washer.
38. Coke extractor from container to generator.
40. Pipe from washer 41.
41. Circulating fan which delivers cooled gas back to regenerator together with the steam admitted to regenerator through pipe 42.
43. Pipe for delivering surplus gas to holder.
45. "Blow" gas from water-gas generator to generator.
47. Stack-valve.
50. Air-blast.

The diagram is a faithful copy from Naef's specification.

Of course, Naef's patents having expired some years ago, there is nothing to prevent Messrs. Travers and Clark, or anyone else, from exploiting them if it is considered that there is anything in the process—which, from my personal experience of passing hot gases through a mass of coal, I think there is not, at any rate with the type of plant described at the meeting.

It may be asked why, being in possession of certain knowledge, I did not stand up at the meeting and disclose this knowledge. Incidentally I *was* invited to discuss Mr. Lane's paper, but declined—and I did so because, from a technical point of view, my criticisms would have been unfavourable, and, secondly, I thought it would be taking Messrs. Travers and Clark at a great disadvantage if I cast this bomb into the midst of a happy and harmonious gathering. Besides, the gentlemen concerned were our guests.

F. D. MARSHALL.

19, *Queen Anne's Chambers, S.W.*,
July 12, 1924.

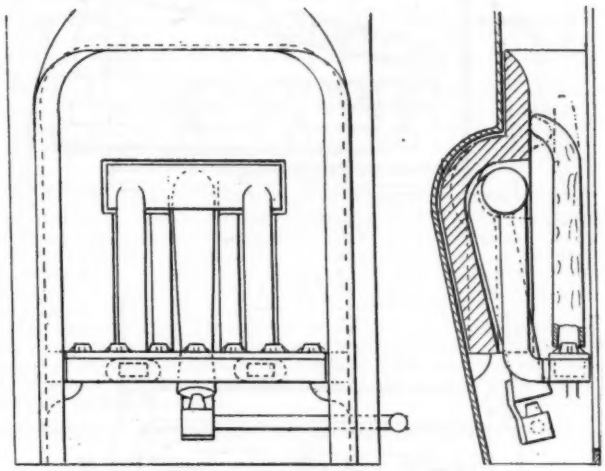
REGISTER OF PATENTS.

Gas-Stoves.—No 216,561.

FLAVEL, P. W., of Leamington.

No. 5245; Feb. 22, 1923.

The objects of this invention for a gas-fire are to increase the efficiency and to obtain the maximum heat in the smallest period of time, and to give the stove a pleasing appearance by reason of the brilliance of its background. The chamber in which the air and gas are mixed is arranged at a higher level than the burner nozzles, so that the mixture is heated before it reaches the



A Preheating Gas-Fire by Flavel.

nozzles and pipes. Air and gas are supplied from a nozzle located below the fire by means of a pipe to the chamber, and pipes leading from the chamber to the burner nozzles; the chamber and the pipes all being situated between the back of the fire and the radiants.

One construction of such a fire is clearly shown by the elevation and vertical section which are reproduced.

Incandescent Mantles.—No. 216,968.

TERRELL, T., of Muswell Hill, N. 10, and MONARCH MANTLES, LTD., of Leyton, E. 10.

No. 7742; March 17, 1923.

This invention is for improvements in or relating to mantles of the kind which are suitable for use in gas, oil, or vapour stoves, and which are intended to be effective in radiating as much heat as possible whether or not they also emit light rays. An important object of the invention is to provide an improved construction of such mantles in the unincinerated condition which can be supplied to the user in that state.

According to a primary feature of the invention there is provided a radiant-heat mantle comprising a permanent skeleton, for example of asbestos, impregnated with a liquid composition containing a caloric agent, a substance which is convertible by heat into a substantially non-volatile oxide of an earthly base as a binding agent for the caloric agent, and a nitrated carbohydrate, for example nitrocellulose, or other suitable volatile binding agent. Preferably the salt of the binding agent is dissolved in the solution of the nitrated carbohydrate; and the oxide value of the binding agent in relation to that of the caloric agent is from 5 to 20 p.ct. by weight. The binding agent may consist of thorium nitrate and calcium nitrate, which may be in the proportion of 4 to 1 respectively by weight. Alternately, the binding agent may consist of thorium nitrate, calcium nitrate, and magnesium nitrate.

In a specific example of this invention which has proved satisfactory in practice, 200 gr. of soluble nitrocellulose are dissolved in 3000 c.c. of ether-alcohol containing equal parts of ether and methylated spirit; and 50 gr. of calcium nitrate with 200 gr. of thorium nitrate are dissolved therein. The salts may be dissolved first in the ether-alcohol and the nitrocellulose added thereto. To the solution thus obtained 1000 gr. of the red oxide of cerium are added and maintained in suspension, so that the whole is of the consistency of cream. The term "red oxide of cerium" is intended to refer to the oxide as prepared from the oxalate of cerium or of the mixed earths. The asbestos skeleton is soaked in this composition and then removed and dried on a former which will give it the desired shape. The drying is preferably effected at a temperature of from 80° to 100° C. An important advantage of the invention is that the mantle when dried is in

a condition to withstand handling, and may be packed and despatched in an unburnt state. It is burnt off when in position; and it is found that there is no shrinkage or warping of the mantle during the burning process.

Other possible modifications of the process are described.

Cooker and Circulator Combination.—No. 217,389.

KEILLOR, G., SMITH, N. S., and SIMPSON, J., all of Greenock.

No. 11,945; May 3, 1923.

This invention relates to combined gas-cookers and hot-water circulators; the arrangements being such that the heat of the products of combustion of the gas used in heating the circulator and the heat radiated by the heater are utilized to raise or to maintain the temperature of the oven.

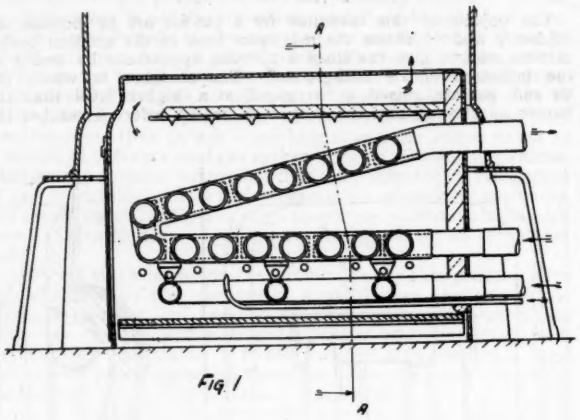


FIG. 1

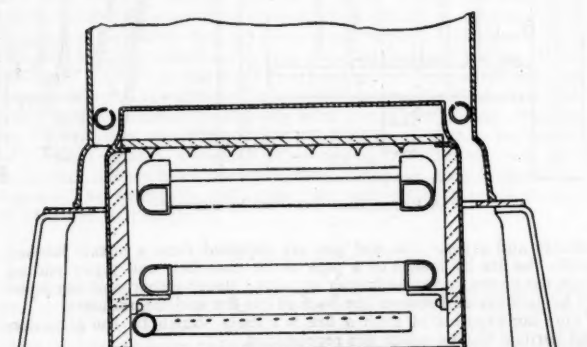


FIG. 2

A Combination Appliance from Greenock.

The invention is illustrated in the accompanying drawings, of which fig. 1 is a vertical section and fig. 2 a section on the line A—A of fig. 1. The combined gas-cooker and hot-water circulator shown includes an oven surmounting a chamber accommodating the circulator. The circulator proper comprises two inclined banks of horizontally disposed tubes connected by headers and so arranged that the entire series of tubes is traversed by the flames and/or the hot products of combustion. Desirably, a baffle of refractory material is located between the tubes and the roof of the chamber, as shown. There is a pilot burner. The circulator is formed as a self-contained unit which may be employed independently of the cooker.

Flue Pipes for Geysers.—No. 217,085.

BROOKS, W. J., of Letchworth.

No. 19,711; Aug. 1, 1923.

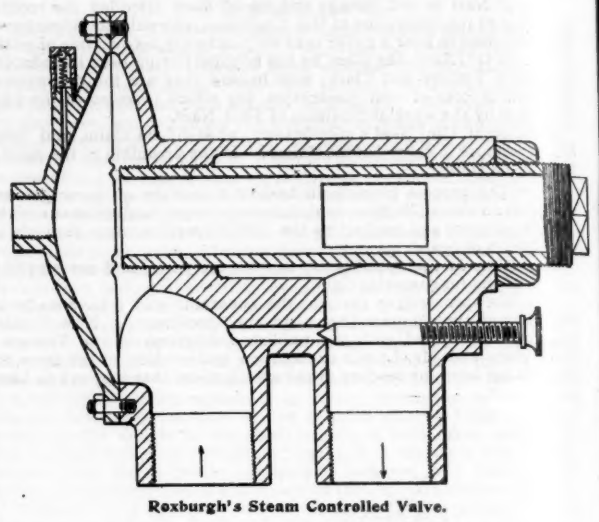
This invention is for a flue pipe for geysers, and seeks to obviate the effects of down draught when there is a strong or gusty wind. Surrounding the flue pipe itself is a larger pipe open at its lower end in the bathroom, and at its other end connected with a cowl below the usual flue-pipe cowl; the object of this being to establish equilibrium of pressure between the bathroom interior and the outside of the house. In addition, there is a baffle box just above the geyser. In this there are baffles which provide as much cross-sectional area as the flue itself offers for the passage of the fumes, but which at the same time protect groups of holes which communicate with the room and permit the gentle indraught of air from the room, and consequently assist its ventilation.

Steam Pressure Control Gas-Valve.—No. 216,984.

ROXBURGH, R. L., of Newcastle-upon-Tyne.

No. 8900; March 29, 1923.

This invention relates to steam-pressure controlled valves for automatically regulating the pressure in all kinds of gas-fired steam boilers and heating apparatus by controlling the supply of gas to the burners, and particularly to valves of the type comprising a single diaphragm forming a partition between the steam and gas chambers; the diaphragm being pressed by the steam pressure towards the mouth of the gas outlet pipe leading to the burners.



Roxburgh's Steam Controlled Valve.

The valve, according to this invention, is provided with means for externally regulating the gas outlet; the means being independent of the gas inlet and outlet pipes of the valve and comprising a tube, one end of which coacts with the diaphragm, while the other end is sealed and extends to the outside of the valve casing where it is provided with means whereby it can be rotated. The tube is perforated to allow the gas to pass to the gas outlet, and is threaded so that rotation causes it to approach or to be retracted from the diaphragm. It is also provided with a by-pass arranged so that its regulating screw lies in the same plane as the gas outlet regulating means. A ball valve is provided to work in the event of any vacuum forming on the steam side of the diaphragm.

The valve is clearly shown in the sectional drawing herewith.

Activated Nitrogen.—No. 217,277.

BONE, W. A., of St. Albans.

No. 5849; Feb. 28, 1923.

The patentee has discovered that when a mixture of carbon monoxide and oxygen is exploded under compression in the presence of nitrogen, not only is the combustion of the carbon monoxide delayed and extended in time as compared with the combustion when nitrogen is not present, but also a part of the energy developed on combustion is absorbed by the nitrogen, which is thereby made chemically active and may be kept in such "activated" condition for a time sufficiently long to permit it to combine with other matter. He has also discovered that the presence of hydrogen in an explosive mixture of carbon monoxide and oxygen containing nitrogen counteracts and hinders or diminishes the activation of the nitrogen.

The present invention is based on the foregoing discoveries, and consists broadly in activating nitrogen by exposing it to the energy developed by the explosion of a mixture of carbon monoxide and oxygen under high initial compression. The invention also consists in activating the nitrogen present in a suitably proportioned mixture of carbon monoxide, oxygen, and nitrogen by exploding the mixture under high initial compression in a closed chamber.

The activated nitrogen produced is useful on account of the readiness with which it combines with certain other substances to make useful products.

In accordance with the invention a mixture of carbon monoxide, oxygen, and nitrogen in suitable proportions is exploded in a closed chamber under high initial compression in such a manner that during or immediately after the explosion the nitrogen present is in contact with the element or substance with which it is to combine or react. Thus in some cases this may be present in the chamber from the first, while in others it may be introduced into the chamber by any suitable means after the explosion. It must be borne in mind that the duration of the activity of the activated nitrogen is brief; for instance, when a mixture of 2 vols. of carbon monoxide, 1 vol. of oxygen, and 6 vols. of nitrogen is exploded in a closed vessel of 250 c.c. capacity, under an initial pressure of 50 atmospheres, the activated condition induced in the nitrogen practically ceases after about 1½ seconds after the ignition.

It should be understood that in general the best proportion of carbon monoxide to oxygen in the mixture is that theoretically necessary for realizing the equation $2CO + O_2 = 2CO_2$. Deviation from this proportion is permissible if regard is had to the nature of any chemical reaction in which the activated nitrogen is to take part, when an excess of carbon monoxide or oxygen may be desirable or of no importance.

With regard to the degree of initial pressure required, while it is possible, on exploding a mixture of carbon monoxide and air in correct theoretical proportion for complete combustion of the carbon monoxide, to detect activation of the nitrogen when the initial pressure of the mixture before explosion is 10 atmospheres, no useful effect is attained until the initial compression used is as much as 30 atmospheres, and for practical purposes 50 atmospheres is to be preferred; so far as present

knowledge is concerned, however, no upper limit to the useful initial pressure can be given, since the activation is greater at 75 atmospheres than at 50, and still greater at 100.

The invention, therefore, embraces all initial pressures above 30 atmospheres, and this is an important part of the invention, for the main effect in regard to the activation of the nitrogen seems to be due to the absorption by the nitrogen of the peculiar radiation emitted when carbon monoxide combines with oxygen in suitable circumstances.

With reference to the freedom of the gaseous mixture from hydrogen, it may be said that while the best results are attainable when this element is wholly absent, and practically no result is attainable when the carbon monoxide is mixed with hydrogen in proportion at all approaching that in water gas or town gas, the presence of 1 or 2 p.ct. of hydrogen does not prevent useful activation of the nitrogen, so that industrial gases containing small proportions of hydrogen—such as blast-furnace gas having this qualification, preferably freed from carbon dioxide—are available.

The invention may be illustrated by describing the manufacture of oxides of nitrogen in accordance therewith, in which respect the invention has the advantage over known methods involving explosion in that it gives a better yield.

A mixture of 2 vols. of carbon monoxide, 2 vols. of nitrogen, and 3 vols. of oxygen compressed to 75 atmospheres, is exploded in a bomb having a suitable inlet valve or valves and release valve, as well as an ignition device, and adapted to withstand the maximum pressure developed on explosion. Any other suitable closed chamber may serve; for instance, when it is required to convert some of the energy of the explosion into power, the chamber may be the cylinder of an appropriately constructed internal combustion engine. Immediately after the explosion the release valve opens, or is opened, and the escaping gases, which become cooled by expansion, are treated by any known method for recovering oxides of nitrogen from gases. Regard should be had to the dimensions of the bomb or exploding chamber. This should have a ratio of volume to surface as large as possible and preferably exceeding 2·5 : 1 (the centimetre being the unit of length), so that during the explosion the reacting gases may be cooled by the walls as little as possible.

It must be remembered that for the activation of the nitrogen the presence of hydrogen is injurious; and in order that the yield of nitric oxide may be a maximum, combustion of the carbon monoxide must be complete on explosion, and additional oxygen must be present for combination with the activated nitrogen. This necessitates the use of an excess of oxygen. Also for obtaining the best yield of nitric oxide, rapid cooling of the products after the explosion is desirable.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 9.]

Nos. 15,602 to 16,223.

BROWN, H.—"Making of joints." No. 16,180.
CONNERSVILLE BLOWER COMPANY.—"Gas-meters." No. 15,920.
COWAN, Sir H.—"Dry gas-meters." No. 15,949.
DOLPHIN, J.—"Atmospheric burners." No. 15,603.
DOWSON AND MASON GAS PLANT COMPANY, LTD.—"Brick for furnace recuperators." No. 15,978.
DOWSON AND MASON GAS PLANT COMPANY, LTD.—"Gas-fired lime kilns." No. 15,979.
GAS-METER COMPANY, LTD.—See Cowan, Sir H. No. 15,949.
GREENFIELD, J.—See Cowan, Sir H. No. 15,949.
HANSFORD, J.—"Gas-meter diaphragms, &c." No. 15,965.
HOWLETT, F. S.—"Metal pipe joints." No. 15,742.
HOWLETT & Co., LTD., M.—See Dolphin, J. No. 15,603.
KOLLER, K.—"Pressure gas-producers." No. 16,125.
KOPPERS COKE OVEN COMPANY, LTD.—"Coke storing, screening, and loading plant." No. 15,800.
KOPPERS COKE OVEN COMPANY, LTD.—"Apparatus for distilling mixtures of liquids." No. 15,801.
MAWBY, E. W.—See Dowson and Mason Gas Plant Company, Ltd. No. 15,979.
MOLL, H.—"Regenerative furnaces." No. 15,724.
PATON, J.—See Dowson and Mason Gas Plant Company, Ltd. No. 15,979.

APPLICATION FOR RESTORATION OF LAPSED PATENT.

Notice is given that CHARLES SCOTT-SNELL and DAVID ANDERSON have made application for the restoration of the patent granted to them for an invention entitled "Improvements in gas-fires," No. 102,626 (106 of 1916), and bearing date Jan. 4, 1916, which expired on Jan. 4, 1924.

LEGAL INTELLIGENCE.

Lighting Specialists' Affairs.

At the London Bankruptcy Court on July 9, the first meeting was held of the creditors of George Light and Cyril George Henry Light, lately carrying on business in partnership as lighting specialists at No. 24, Lower Marsh, London. The Receiving Order was made on June 24, and the debtor, Cyril George Henry Light, had stated in his preliminary examination that after he was demobilized in June, 1919, he obtained employment in the lighting business, and in May, 1920, with his father, George Light, who also had considerable experience in this class of business, started in partnership under the name of the Visso Light Company, at No. 17, Cloth Fair, London. Larger premises were taken at Lower Marsh in September, 1920, and the business (wholesale and retail) was continued there. Owing to depreciation of stock and slump in trade, they were obliged to cease trading. In June, 1923, the Visso Lighting Corporation, Ltd., was formed, and took over the assets. He attributed their failure to depreciation in value of goods and loss owing to the slump in trade and conversion of lighting to electricity by several of their regular customers, and heavy cost of advertising. The liabilities were estimated at £1600, and there were assets of uncertain realizable value. The estate was left in the hands of the Official Receiver for administration.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

On behalf of the Newcastle-upon-Tyne and Gateshead Gas Company, a petition has been deposited against the Newcastle-upon-Tyne and Gateshead Corporations (Bridge) Bill.

HOUSE OF COMMONS.

Progress of Bills.

Rhymney and Aber Gas Bill: Reported from the Examiners that the Standing Orders have now been complied with. The Bill was read a second time, and committed.

Gas Regulation Act.

Copies were presented of drafts of Special Orders proposed to be made by the Board of Trade under section 10 of the Act on the application of the Emsworth Gas and Coke Company and the Pinner Gas Company.

The drafts of Special Orders in regard to the applications of the Emsworth Gas and Coke Company, Reading Gas Company, South Bank and Normanby Gaslight and Coke Company, and the Watford Gas Company were agreed to, on the motion of Mr. Albert Alexander.

Gas-Mantles.

Mr. HOGGE asked the President of the Board of Trade whether he had received an application from certain British firms of gas-mantle importers to refer, under section 9 of Part II. of the Safeguarding of Industries Act, the revocation of the Order of Oct. 9, 1922, to a Committee for further consideration, in view of the fact that the British £ is now only worth 18½ gold marks; and whether he proposed to grant the application.

Mr. WEBB replied that the answer to the first part of the question was in the affirmative. The applicants had been informed that on a review of all the circumstances the Board of Trade were not prepared to refer to a Committee the revocation of this Order, which automatically lapses on Aug. 19.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following further notices regarding applications to the Board of Trade under the Gas Regulation Act.

Borough of Mossley.

The standard prices now authorized in respect of the supply of gas by the undertakers are 3s. per 1000 c.ft. within the borough and 3s. 2d. outside; and the prices they have asked the Board of Trade to substitute for these are 9·6d. and 10d. per therm respectively.

Oakham Gas and Electricity Company, Ltd.

The standard and differential prices now authorized in respect of the supply of gas by the undertakers are: (*a*) A standard price of 4s. 6d. per 1000 c.ft. within the urban district of Oakham and the parishes of Barleythorpe Langham and Burley in the rural district of Oakham, and (*b*) a differential price of 6d. per 1000 c.ft. within the parishes of Braunston, Whissendine, and Ashwell in the said rural district; and the price which the undertakers have asked the Board of Trade to substitute for these prices are 1s. 5d. and 1·2d. per therm. It is also proposed that additional charges be authorized as follows: For a prepayment meter and fittings (including a cooking stove), 3·6d. per therm. For a prepayment meter and fittings (not including a cooking stove), 3d. per therm. For a prepayment meter without fittings, 1·8d. per therm.

DECLARATION OF CALORIFIC VALUE.

Newtown and Llanllwchaiarn Urban District Council.—475 B.Th.U. in substitution for 430 B.Th.U. (Oct. 11.)

HASTINGS AND ST. LEONARDS GAS ORDER.

[*Concluded from p.* 267.]

Mr. *Botley*, in the course of re-examination, referred to the statements made by the opposition that the area to be added to the existing limits was sparsely populated. He maintained that development was taking place, and that there was a demand for gas in some parishes. He mentioned one main which was to be laid, on the Guestling and Pett route, some 3 miles in length, along which there were over 100 houses. He had had a request for gas from 37 of the occupiers; there were 30 who wished to be called on again later; while the remainder were mostly aged people who, naturally, did not feel inclined to change over to gas. This area was immediately adjacent to the existing limits. There had been requests for gas from a number of other parishes. As to the Battle gas undertaking, judging by the last decision of the Directors of the Hastings Company not to acquire it at the price

quoted, it did not look as though they were anxious to own it. He had never had the slightest intention of supplying in competition with the Battle Company.

Mr. A. J. LEES (for the Battle Company) then submitted that the promoters had no case. The only evidence put forward was that of the Engineer and Manager of the Hastings Company. He had given no estimates, no particulars of expected consumption, and no figures at all. Why? Because he had told Mr. Honey, quite candidly, that "the whole thing was problematical." The Hastings Company asked for powers to supply in this vast rural area and the urban district of Battle, though they could put forward no figures on which Mr. Honey could form any idea as to whether it would be profitable or possible, or whether it was fair to their own consumers or to prospective consumers in the new area. If Mr. Honey would look at the census returns for 1911 and 1921, he would know that it was not only problematical, but extremely improbable, that they would ever do anything for years to come, except possibly supply a few customers between Guestling and Pett. Nobody could conceive that there was the slightest chance of doing anything. A more rural area, he suggested, it would be impossible to find outside Westmorland. As to the Battle Company, they had been supplying gas for 53 years. It was perfectly true that, during the war, they had naturally got into low water. They had had to close the works when the price of coal had risen to the figure reached in April, 1921, and had been advised to sell. The Hastings Company might then have bought the undertaking; but others had purchased it, had spent a considerable amount of money on it, and had not received a penny piece in return. The Directors had had no fees, and the shareholders no dividend, because it was the desire to put the undertaking into a proper condition to enable them to supply the consumers at a reasonable price. They had knocked the price down 2s. 6d. per 1000 c.ft. already. He submitted that they had done for this little undertaking as much as it was possible to do, and more than any other people would have done or could. Then there was correspondence with the Hastings Company, who were obviously nibbling, and they had had the chance to buy it. Nobody from the Hastings Company had seen the works since 1921, and they had not the faintest idea of what had been done. Mr. Botley had put the price at £4500, though he had not seen the works for three years; and on this, apparently, the Hastings Company had turned it down. If they had paid the £4500, they would then have closed the Battle Works, and would have had to lay a main from Hastings, which would have cost another £3500. Then—and this was most illuminating—Mr. Botley had said that the Hastings Company could manufacture more cheaply than the Battle Company, but whether they could distribute more cheaply than the Battle Company was another matter. This was the whole question. It was not a question of the cost of manufacture in Hastings, but for how much they could deliver the goods in Battle. The Hastings Company knew that their proposal was a forlorn hope, and they had not the remotest chance of getting the Board of Trade to do a thing they had never done before—namely, authorize them to compete with the Battle Company under conditions of this kind. They had said they were not anxious to acquire the undertaking. They had not the power to do so. The Order, as drafted, did not propose to do it; and if the Order were made in the form it was asked for, they could not acquire the undertaking. Again, they did not desire to compete with the Battle Company. Why? Because they knew they could not. The thing was perfectly ridiculous, on the face of it. Then they had said they would not compete with the Battle Company in the area now supplied by the latter Company, but asked to be allowed to supply in the remainder of Battle. They asked that the Battle Company should be tied down to their present area, after they had spent a great deal of money in developing the undertaking, and had put in new plant to increase the capacity, so as to be able to supply a bigger area. It was the most monstrous proposal that could be put before a tribunal. The only consumption worth anything at all in the whole of the area proposed to be added to the Hastings Company's district was that in the centre of Battle (which was supplied by the Battle Company), and he was not surprised that the Hastings Corporation wanted to know where they stood. No one could conceive that anybody in his senses would lay mains to supply this rural area, with its decreasing population. It had been said that since 1921 the population had increased, but there was not a shadow of evidence to support this contention. Therefore, he submitted that there was absolutely no case for this Order.

Mr. COOPER pointed out to Mr. Lees that this point was not raised in his objection.

Mr. LEES said that, in asking that Battle should be cut out, he was entitled to say that if it were cut out there would be nothing left. The houses on the route from Guestling to Pett were the only houses which it had been suggested should be supplied, and there was no evidence that consumers there wanted a supply. In other cases before the Board of Trade there had been evidence to show some demand. It was obvious that the Hastings Company could not get power to compete with the Battle Company, and he felt inclined to ask whether it was worth while pursuing the case, though he was prepared to call evidence.

Mr. HONEY said he did not need evidence from the Battle Company. It was pretty clear that he could not recommend the Board of Trade to give the Hastings Company power to go into the Battle area without the consent of the Battle Company.

Mr. COOPER asked what Mr. Honey called the Battle area.

Mr. HONEY said he imagined it was the Battle Urban District. If the two Companies could come to some agreement, he would be prepared to recommend that a clause should be put into the Order authorizing the Hastings Company to supply throughout the Battle Urban District. But in the absence of an agreement of that sort, he thought it would be quite contrary to any precedent; and, so far as evidence in this case was concerned, there was nothing before the Board of Trade which would warrant their creating a precedent.

Mr. COOPER pointed to the Wadhurst District Gas Act of 1914. In that case the Wadhurst Gas Company had applied for an extension of their area, including a parish which was supplied by a small works owned privately by two engineers, and a clause was inserted to prevent the Wadhurst Company supplying in that parish until they had purchased the gas undertaking there. He suggested such a clause should be inserted in the present order.

Mr. LEES said that that concerned a rural parish, and the case was not comparable with the present one.

Mr. COOPER held that it was. The Wadhurst Company were not prepared to pay the price asked, and the clause was agreed upon when the Bill reached the Second House.

Mr. LEES again emphasized that if the Battle Company were limited to the area they now supplied, they would be crippled, after having developed the undertaking, and after the Directors and shareholders had foregone their fees and dividends, and the would-be consumers in Battle, outside the area now supplied by the Battle Company, would not get a supply. The Wadhurst case was not comparable. There was no precedent for doing what the Hastings Company wanted, and he challenged the promoters to produce one. He asked that the urban district of Battle be struck out of the Order. Then, if Mr. Honey thought fit to recommend the Board of Trade to give the Hastings Company a rural area which would necessitate their passing through Battle, he supposed the Battle Company would not raise objection to a main being laid through their area.

Mr. HONEY asked Mr. Lees if he pressed his point so far as to object to a clause which would enable the Hastings Company to supply in Battle with the consent of the Battle Company or by agreement with them.

Mr. LEES said the answer to this was simple. The Hastings Company had said they did not want to buy the undertaking—there was nothing in the Order empowering them to buy it, and nothing in their notice suggesting that they should do so. In these circumstances it was useless to put such a clause in the Order.

Mr. COOPER, dealing with the suggestion that he had no power to purchase, said he was not satisfied that it was necessary, if he had powers to supply in a certain district, and powers that involved purchase. He could, for instance, buy mains.

Mr. LEES retorted that at last "the cat was out of the bag." The Hastings Company wanted to buy the mains without the goodwill of the undertaking.

Mr. HONEY then intimated that if an agreement between the Battle Company and the Hastings Company were arrived at within the next fortnight, and it was an agreement that could be given effect to by a clause in the Order, he would recommend the Board of Trade to accept a clause of that sort. Otherwise, he would suggest to the Department that the Battle Urban District should be struck out.

Asked by Mr. Cooper if he would give the Hastings Company a right to lay a main in Battle in those circumstances, Mr. Honey said he did not know.

Col. COX then addressed Mr. Honey for the Hastings Corporation, and rested his case simply and solely on the undertaking which had been given by Mr. Botley. The Corporation were prepared to accept the modified form of undertaking, so that the consumers in the borough only should be protected; but no sooner was the undertaking given than an attempt was made to repudiate it. He had never been accustomed to having undertakings given by a representative of a company treated in a way the undertaking had been treated in this case, and if reliance could not be placed on honourable undertakings such as that, then Westminster business would close-down altogether. It was most definitely in the public interest that one should be able to rely on an undertaking such as given by Mr. Botley; and he asked Mr. Honey to recommend to the Board of Trade, as a mark of disapproval of the procedure which had been adopted by the Gas Company, that the Order should not be granted unless and until the undertaking given was put into a form which would make it binding on the Company. He laid stress upon the fact that the Town Clerk in his letter had emphasized that his Agent had not in any way exceeded his instructions. The Town Clerk would be willing to give evidence if it would be of any assistance to Mr. Honey. Col. Cox then dealt with the various clauses to which the Corporation had objection, as already indicated in his cross-examination of Mr. Botley. With regard to the 7 p.ct. dividend on the new preference shares, he accepted the statement that the Town Clerk had agreed to this figure. The Town Clerk had confirmed that. As to the clause for the provision of a renewals fund, he submitted that this was unnecessary, because the Hastings undertaking had been carried on perfectly well without it in the past; and, of course, the difficulty was to know exactly what maintenance and renewal of plant and works were. The Corporation, in common with a number of other local authorities, feared that there was a tendency to create too many funds of one sort and another. On the other hand, if the Board of Trade thought it was desirable to grant the clause, the Corporation asked that the total money put to the special purposes fund and the renewals fund should be limited to the amount formerly allowed for the special purposes fund only—*i.e.*, 1 p.ct. per annum of the paid-up capital of the Company, and not at any time more than 10 p.ct. of the paid-up capital; so that the annual appropriation to each fund should be limited to 0·5 p.ct. of the paid-up capital, and the total amount of each fund should not be more than 5 p.ct. of the paid-up capital. With regard to the clause giving power to enter into agreements with other companies as to supply of gas in bulk or otherwise, Col. Cox reiterated the amendments asked for, and said that, in the Rhymney and Aber Gas Bill this year the clause was reviewed, and Parliament had assented to those amendments.

Some questions were then put by Mr. Honey to Mr. Botley with regard to the clause providing for a renewals fund.

Mr. *Botley* said that if he had a renewals fund he would not need to put the cost of large repairs to a suspense account. His retorts were of the ordinary horizontal type, and worked for about three years. Ordinary repairs of retorts were carried out regularly as far as possible, but as a rule retorts were renewed once in five years. The renewal of a retort would come out of the renewals fund, and not the special purposes fund; the latter would be used if they did away with the system altogether and put up a new one.

Mr. HONEY then asked whether, if the Company did not get power to supply in the extended area, they would attach importance to going on with the rest of the Order.

Mr. *Botley* replied that the Company would still require the Order.

The inquiry then closed.

EUROPEAN GAS COMPANY, LTD.

Annual General Meeting.

The Annual General Meeting of the Company was held at the Offices, Montague House, Devonshire Square, E.C., on Tuesday, July 8—Mr. H. E. JONES in the chair.

The GENERAL MANAGER AND SECRETARY (Mr. F. Eliot Williams) read the notice convening the meeting, the accounts for the year, and the Auditors' certificate.

The CHAIRMAN moved the adoption of the report and accounts for the year ended March 31. He came, he said, fresh from a visit to the works, and the areas supplied by the Company in France, and he was happy to say that the increase in the number of consumers of 5 63 p.ct. over the previous year had been borne more easily during the past year than in any preceding year since the outbreak of the war, for the reason that all the works were in capital order. There were very few Continental works in such a condition, least of all in France, where the invader had been devastating everything, and where money was very, very short; they would bear comparison with the best works of the sort in England. In no respect had repairs been neglected. They were somewhat heavy, especially in regard to such things as mains and service pipes. The enormous traffic on the roads, and the very heavy loads carried, had interfered so much with the paving, and the roadway under the paving, that where the Chameroy system of piping existed those pipes had been crushed and deformed, and were out of shape. They would not necessarily be leaking, because they were made of the very finest plated iron—what was called charcoal plate iron—covered by bitumen, and so long as that bitumen was undisturbed by outside pressures the pipes would last almost as long as cast-iron pipes, because the bitumen preserved the iron from the only enemy it had, which was the rust caused by moisture in the soil. But the roads now had to bear wagons carrying 5 or 6 tons, and in war times they carried many more tons, by *force majeure*—pieces of ordnance and munitions of all sorts were carried all over the place. In the great town of Havre, and ultimately even in Nantes, when the Americans landed there to come to the aid of the French—in Boulogne, and in Rouen especially, where there were great collections of Army stores—the roads were submitted to traffic which was never contemplated by the road makers or the people who had put the pipes into those roads. Therefore, the Company had dealt with those repairs in the thorough way—and he assured the shareholders that the Directors would not be satisfied with anything less—in which an English company kept up its distributing system. In Amiens, where the Germans were in occupation, the roads were so damaged that the Company had received special compensation from the town and the Government. Actually the pipes were smashed and broken by explosions. That was soon put right, after the war, however—much sooner than in the case of the Company supplying in the adjacent area, which was a French Company—because, once the war was over, the Directors had ordered that everything should be done to restore the gas lighting to its original condition of perfection.

AFTER THE WAR.

Apart from this, the action of time came in. When war broke out, the Company were steadily pursuing the course—which they resumed after the war—of modifying and modernizing all the carbonizing plant, repairing the gasholders, and in some cases adding to their capacity. This policy had been pursued for some years before the war, but was necessarily arrested during the war, and things then went from bad to worse, because they could get neither men nor material nor the necessary Government permission to proceed with such work. When peace came, or what was called peace—which was anything but peace to the Company, because they had made less profits during the peace than during the war—the price of material was forbidding, and all the while the rate of exchange in francs kept jumping up, and the price of everything in France had advanced to threefold, and at one time nearly fivefold, what it had been. The old normal condition of 25 francs to the sovereign was gone, and the loaf of bread, the pound of beef, and so on, had to be advanced in the same way as the English sovereign, because they were essential and intrinsic values. The Company, therefore, had been affected very much by the question of cost, but, at the same time, they had thought it desirable—it was necessary, in fact—to establish a formula for each town, which formula had to be approved by the Prefect of the district, for meeting the extra charges necessary in the production of gas. At one time, as indeed in England at the time of the coal strike, gas was being supplied not only at a loss, but at a very heavy loss. The gas was costing twice what was being paid for it, and it reflected upon the energetic action of the staff that a system was evolved by which in each town there was adopted a formula for calculating what was a fair price for the gas, based on the advanced price of coal and labour, the cost of living, and so forth. This worked out very differently in different towns, but it did work so that the Company had a *modus vivendi*, at any rate. He knew that the Company had been paying very modest dividends—indeed, the dividend had been cut down in one or two years beyond reason—but they had gradually worked up, and this year would have paid 5 p.ct. dividend but for the extraordinary fluctuations of the franc. According to the French prices in the towns, they had made a sort of profit, but directly they had converted that profit, in francs, into gold in London, they had suffered by these depressions in the comparative value of the franc. But they had to allow also for the extraordinary expenses still to be borne in connection with the repair of the distributing system. He was glad to say that the repairs of the works were practically completed, and there was only one works where the plant was still a little more old-fashioned than they liked. He believed he could say that the prospect, in every way, was an exceedingly promising one. The contracts had now been settled. They had not only established the formulæ referred to, but the staff had been working very hard and had negotiated further arrangements, by which, by surrendering some of the Company's claims for losses, which the municipalities had to pay to the Company, they had acquired a further extension of their contracts. For instance, in Boulogne, they had now a period of 26 years where they formerly had 16; in Caen they had 32 years, where they had 17; at Havre, one of the best towns, they had just completed the negotiations, and had got 46 years instead of 6; and at Nantes they had 32 years instead of 22. At Rouen they had not settled any extension, but had a very good settlement on the formula basis as a *modus vivendi*. In all these cases the effect of extending the contracts was that the sums for depreciation and the amounts set aside for amortization would be necessarily reduced, and therefore, from that source alone, they expected considerable addition to the profits in the coming years. In the absence of any extraordinary fluctuations of the franc, about which no man living could prophesy, the Directors were of opinion that, having spent so much money on repairs of works, and not having such an expenditure to look forward to in that direction as there had been previously—though for some years there would be further expenditure on the distribution system—probably after this year the shareholders would not be asked to take so low a dividend as the one they were offered that day—namely, 4 p.ct., with income-tax paid. Altogether—with the income-tax paid—this did not compare very unfavourably with the average dividend that had been paid, under the Gas Regulation Act, by some of the largest companies in this kingdom.

IMPROVED WORKING CONDITIONS.

Having visited the works lately, he had found that not only had the repairs been well carried out, but there was a decidedly improved condition of operation of those works. The labouring men, who had been disturbed by the war, as in this country, had returned steadily to their work and were working better than before. There was more orderliness, and more attention to questions of detail, such as the saving of what would have been small losses, and things of that sort. In addition, he had found that the number of consumers was rapidly increasing. The General Manager had set his heart upon increasing the sale of gas, and had put the staff very energetically to work on it. This was not a very easy thing to do, because, if we in this country were poor, he could assure the shareholders that Frenchmen appeared to be very poor. There was very little loose cash, though he thought they were fairly well off in the "long stocking." France was a self-supporting country, and on the land they produced nearly all they wanted. The landlords were very different from those in this country; they were "riches." Also the farmers were "riches," and when he came to the peasants he was told that they were still more "riches," in proportion to what they had been before these "hard times." Of course, they had refused to tax themselves, and therefore the franc, for the time being, was fluctuating. They had their own ideas about it. They thought that if they had a big debt owing to them by the rapacious German, who had devastated their fair provinces, it would be unwise for them to pay the bill themselves, as we in this country were doing, unfortunately. We were very generous to do this, but the Frenchman did not take that view of it at all. Therefore, under the conditions of the much higher price of gas, which the formulæ imposed upon consumers, and in the face of the tightness of the money-chest, he considered it was wonderful that the Company had secured more consumers; the propaganda which the General Manager had organized, and which the whole of the staff were working hard to promote, had resulted in a substantial increase. The number of extra consumers in 1914 over 1913 was 6824, and the increase in 1924 over 1923 was 7132, so that not only were the Company getting new consumers, but they were adding to the number of these; and this needed considerable effort. Efforts had been made in all towns by demonstrating the modes by which gas could be burned; and the Company were paying great attention to the improvement of their showrooms in the towns, in which illustrations were given of all the apparatus which added to the comfort of the home and performed domestic services by the use of gas. In this connection he ought to say that the Company had been exceedingly prudent and long-sighted. The first thing that had struck him when he had joined the Company's service as Consulting Engineer, before going on to the Board, was that it was the habit in every town in France for the gas companies to have exhibitions of how to use the gas; 35 or 36 years ago there was in vogue in France what was heralded with such a flourish of trumpets in London to-day. He noticed that Mr. Paddon (a shareholder and Chairman of a number of gas companies) smiled. Mr. Paddon's father was a very old friend of his (the Chairman's), and he would have been amazed if he had been asked to establish the large staffs which were going about demonstrating the use of gas, and to incur the extraordinary outlay on fittings. The public mind had not been educated here; but in France they were doing this, and he had found that there were more gas-engines used, in relation to the size of the gas companies, than anything approached in England.

The Chairman advised the shareholders to adopt the Report and Accounts, and intimated that he would be happy to answer as many questions as could be addressed to him. There were two letters from shareholders, one in France and one in England. The Englishman was disappointed with the small dividend to be paid, but was not so disappointed as himself (the Chairman). He (the Chairman) had been astonished to find that the franc had been playing so fast and loose with the Company, when they were spending money on their works. The gentleman in France thought the Company would do better by using French coal. As a matter of fact, the Company did use it at Amiens, because the town was very near the French coal measures, and it would be foolish to use anything else, but the reports which were being received constantly from Amiens had proved that it was not so good as English coal. In confirmation of that experience, he might say that the Paris Gas Company and all the leading gas companies in France bought a large proportion of their coal in the English market, because English gas coal was, he believed, unsurpassed.

Mr. MEWS seconded the adoption of the report and accounts. The Chairman had gone most thoroughly into the position, and he did not think it was necessary for him to say anything, except that he agreed with the remarks.

QUESTIONS BY SHAREHOLDERS.

Mr. BISGOOD asked what was the object of keeping the accounts of

the Company confidential. Why could they not be issued, as in the case of other companies?

The CHAIRMAN said the reason was that the Company were constantly making contracts with municipalities. If Mr. Bisgood were a contractor in England, making contracts with different authorities for the performance of a public service, he would be very reticent in regard to accounts.

Mr. BISGOOD said after all, it was a public Company. He considered the figures were perfectly ridiculous. Again, why could not they have a proper profit and loss account? There was nothing of the sort here. Where were the details? He would like to know what the revenue was, what the expenditure was, where it went, and the usual facts given to shareholders in public companies. Another thing he would like to know was whether the formula referred to was a sliding-scale depending on the value of the franc.

The CHAIRMAN replied that it was.

Mr. BISGOOD said in that case he could not understand why the results were so bad. The net profit was given as £18,000 odd, but there was nothing to show how the figure was arrived at. In any case, if the formula depended on the franc, what arrangements had the Board made to move the money to this country? For three months this year the value of the franc was 70 to the pound. Was advantage taken of that, or was the money moved when the franc was at 100?

The CHAIRMAN stated that it was moved when the franc was as near 70 as possible.

Mr. BISGOOD said this made it worse, because it made the profit so bad. As a matter of fact, if the figures given in the report showed the results of the Company's working for the year, it would be infinitely better to sell the gas-works. They were fine works and fine concessions, and, instead of the shares standing at about 6¾, the shareholders would probably be receiving, if they were properly sold, about £30 per share, which would be much more satisfactory to them. The shareholders were told very little. He was interested in many companies, and was on the Stock Exchange, so that he knew something about finance; and it had never been his lot previously to look at a statement so bare as the one presented to the shareholders of this Company.

Mr. R. M. LONG asked if the difference in profit as between 1923 and 1924 was due entirely to the exchange, or was it due to the heavy expenditure incurred in repairing mains?

The CHAIRMAN replied that, unfortunately, it was due very much to income-tax, on the three years' average system. The Company actually paid more of the profit in income-tax than they kept for themselves this year. This was the effect of the three years average. As to repairs, however, he would never sit in the chair of any Company, and pay dividends, without renewing the wastage of the undertaking thoroughly and well, and that was not done to-day by other companies on the Continent of Europe. They had a very good excuse for it, perhaps, but it was not done.

Mr. A. M. PADDON, speaking with forty years' experience of the gas industry, both in this country and in the south of Europe, said he did not quite appreciate the criticism made by Mr. Bisgood. He would remark that it was rather of a *prima facie* kind, and did not take into consideration that this was an undertaking of a special kind, administered under special and adventitious circumstances. It would not be prudent, politic, or in accordance with the experience of those in similar administrations, to publish the operations of the Company in the same detail as was contingent upon the conduct of such an undertaking in this country. Working in an exotic and a foreign atmosphere, as they had to do to get their results, they could not possibly disclose in detail the means by which those results were obtained without creating a perfect fog of misapprehension and suspicion in the countries in which they operated. He took it that they had a stern and searching critic of the conduct of these undertakings in the municipalities they served, and in the French Governmental Authorities who had granted the powers; and if the figures as presented to the shareholders satisfied that searching criticism, the shareholders might be perfectly certain that the figures and statistics presented to them were sound in their foundation and in their substance. They certainly would not be allowed to pass unchallenged by those who had the keenest possible interest in scrutinizing and criticizing them from their self-interested point of view. He did not think any undertaking operating at present in any foreign country could afford to disclose in their entirety details which must be open to misconception, and which could not be understood in the actual area in which that undertaking operated as they would be here. One little sentence dropped by Mr. Bisgood had rather illuminated his criticism. The shareholders were not concerned with the future of this Company from a stock-broking point of view. They did not want to realize shares for the transient interest of those who happened to have a stake in the Company at the present time. Speaking as one with a considerable stake in the Company, and as representing many gas proprietors, he said he thought they looked rather to the future, when they were to have the return for these lean years in improved conditions, because conditions could not be worse five years hence than they were five years ago. It seemed to him that to contemplate or suggest the sale of a business at the lowest point in its career, whether from a stock-broking or any other point of view, must be the worst possible finance. He was not speaking offensively, but he wished it to be realized that in no statutory undertaking of this country which he directed—and he directed a good many—did he ever allow the voice of the stock market to influence him as a trustee of the shareholders' property.

Mr. PORTLOCK said he thought that perhaps it would help them if they could be given some idea of what had had to be paid for income-tax this year. He was interested in a number of countries which had been very badly hit by the exchange, and it was a very difficult thing to cover one's self against. He was particularly interested in Brazil, and his experience had been that the only possible course was to cover themselves from day to day. It was rather difficult to understand why there should have been such an enormous fall in the profits of the Company for the year under review, unless income-tax accounted for a big slice of it, seeing that we in this country had had what he might call a very favourable French exchange for three months in the year. If he were not asking the Chairman to disclose anything detrimental to the interests of the Company, might he ask if it were the policy of the Company to keep themselves covered as regards the French exchange from day to day? Were they covered to-day, or had they lost money? He did not blame the Directors, because everybody had hung on and lost money in the past to see how things went on, but he did not think a Board of Directors ought to speculate on a possible improvement in the exchange.

The CHAIRMAN replied that they never did. By watching the market very carefully, they got money over to this country whenever the rate was down. As to the suggestion that they should sell the undertakings, that was not their view. He might say that they had had some rather mysterious notifications from the Stock Exchange, asking whether they would not sell or combine with a certain other company.

Mr. BISGOOD said if this were meant for a hint that he had had anything to do with any suggestion such as that, it was absolutely untrue.

The CHAIRMAN said he would leave it at that. With regard to the form of accounts, there was something a little misleading in the heading. It should be "Net Profit and Loss Account," because it dealt with the division of profits. The revenue account they were not going to show. He had refused to do so many times, and would refuse to do so again.

Mr. BISGOOD wanted to know whether this was a limited company or not. The Chairman talked as if he had the power to do as he liked with a body of shareholders. He talked like an autocrat. The shareholders were entitled to the figures.

The CHAIRMAN retorted that the power was in the hands of the shareholders. He had advised them, and he thought they would listen to him, and not to Mr. Bisgood.

Mr. BISGOOD said that if the Chairman "advised" them, that was another matter.

Mr. PORTLOCK thought that what the Chairman had referred to as a "Net Profit and Loss Account" was really an appropriation account.

The CHAIRMAN said the top half was a balance-sheet, but the bottom half ought to be called a "Net Profit and Loss Account."

The report and accounts were then put to the meeting, and adopted *nem. con.*

The GENERAL MANAGER AND SECRETARY, speaking with regard to the formula mentioned, said it was based on coal prices, coke prices, and wages in the preceding three or six months. Therefore, on a rising market, the price of gas was always behind the costs. On the other hand, on a falling market it was above the costs. As in the case of any other gas company, their best period was that from Christmas to March. In this period of this year, the rate of exchange was up to 117 francs, and was ranging about 100. Therefore, the coal shipped from here went to France and was invoiced at the high franc rate, but the price of gas was based on the prices ruling in the previous three months. This would right itself in the present and following quarters. The exchange was covered from day to day. He was in daily communication with the bank, and money was coming from Paris every day on the slightest drop; they did not hold any money.

A SHAREHOLDER asked how the income-tax would work out for 1924-5.

Mr. WILLIAMS said he was not sure of the exact figure at the moment, but, at a guess, there should be a saving this year of at least £10,000. They were hit by a year of heavy profits which came into the three years' average.

The CHAIRMAN added that shareholders were perfectly welcome to ask questions in the office, and to see the books, if they wished to do so. Facilities were always extended to every shareholder who required to make close inquiries, but the Company did not think it wise to publish those things to the whole world. The income-tax accounted for practically double the net profit, because they were paying on the three years' average.

THE DIVIDEND.

The CHAIRMAN then proposed that the interim dividend of 2s. per share paid in February last be confirmed, and that a final dividend of 6s. per share, making a total of 8s., free of tax, be declared.

Mr. W. G. BRADSHAW seconded this, and it was agreed to.

RE-ELECTIONS.

Mr. JOHN MEWS proposed the re-election of Mr. H. E. Jones as a Director. Mr. Jones was a man they all knew—if they did not know him they could not possibly be gas shareholders at all. Nobody who knew him well had any doubt about him; he was everything they could possibly want. All he could say was that the longer they went on the more they liked Mr. Jones. It was clear that he was a fit person to have on the Board.

Mr. BRADSHAW seconded, remarking that he had worked with Mr. Jones for something like 36 years. He knew his job, and that there was no one who knew it better.

The resolution was carried unanimously.

The CHAIRMAN expressed thanks for his re-election. As to Mr. Bisgood, he was sure that, if he came to the office and had a talk over the books, they would part the best of friends. He hoped that, after so many years in the gas industry, he had accumulated a little experience and wisdom, and assured the shareholders that it would always be at their disposal.

The CHAIRMAN then moved the re-election of Dr. Charles Carpenter (Deputy-Chairman) as a Director, and regretted his absence from the meeting in consequence of a cold. In case there might be any doubts in the minds of the shareholders as to the administration of the Company on the financial side, the Chairman said that Mr. Bradshaw was Deputy-Chairman of the Midland Bank, and Mr. Mews was also an old bank Director. If those two gentlemen could not tell them how to steer this ship, he did not know where to look for guidance. In Dr. Carpenter they had a very modest, quiet, and unassuming gentleman, whom he had known for forty years, and who was President of the South Metropolitan Gas Company. Those were the sort of people he looked to. Another Director was his (the Chairman's) son, Mr. F. H. Jones, though he (the Chairman) had not asked that he should be put there. The aim had always been to get the best, most competent, most independent, and upright service.

Mr. PADDON said it was a privilege to second the re-election of such

a Director as Dr. Carpenter, particularly in association with their Chairman. Everyone knew that the Chairman was the doyen of the gas industry—the oldest member of it—and he must bring to the counsels of the Board an experience unrivalled in extent If the Chairman had the largest portion of experience, Dr. Carpenter had clearly the widest and most complete technical experience, wider than any gas administrator or engineer of his day. He (Mr. Paddon) did not speak of what he did not know. He had been a gas engineer himself for many years, and if that had given him no other capacity, it had given him the capacity of estimating the extraordinary work done for the gas industry by Dr. Carpenter, which had never properly been recognized by the gas industry. As an administrator, they might say of him, in connection with the South Metropolitan Gas Company —as had been said, perhaps with less reason, of St. Paul's Cathedral —"If you want the monument to the architect, gaze around." What had been accomplished by Dr. Carpenter for the South Metropolitan Gas Company must convince every proprietor who knew anything about it—and very few proprietors did know anything about the gas industry. They should obtain and retain such skill, experience, and knowledge as that of Dr. Carpenter at their councils, and he therefore begged to second his re-election.

The resolution was carried unanimously.

Mr. PORTLOCK moved that Mr. G. C. Goldsmid and Mr. W. B. Brady be re-elected Auditors.

Mr. BISGOOD asked whether these gentlemen were chartered accountants.

The CHAIRMAN said they were not, but they had been connected with gas accountancy all their lives, and one was an old servant of the Company. He pointed out that the Company's private accountant (Mr. Heather) was a Graduate of the London University, and there was also the General Manager. He (the Chairman) would be sorry to put Mr. Brady, who was in the Accountant's Department of the Company forty years ago, out of his job in order to do justice to a mere sentiment; and he trusted that the shareholders would again be advised by him, and would re-elect the gentlemen who had served them so long and so well. He was not against a chartered accountant.

Mr. HY. JACOB seconded.

The resolution was carried.

Mr. PORTLOCK suggested that the Company should appoint a chartered accountant in their place if and when they retired.

Mr. PADDON said the legislature allowed companies to retain auditors who were not chartered accountants until there was a change, so that there was direct parliamentary sanction of the retention of office by non-qualified men.

VOTES OF THANKS.

The CHAIRMAN then proposed a vote of appreciative confidence and gratitude to the staffs. The whole of the staffs in France were Frenchmen; the solicitors were Frenchmen; and they had accomplished accountants in France who were Frenchmen. There was also a number of the staff in England. He could only say that at each station within the last three or four years a tremendous amount of work had had to be done, in negotiating the fresh terms and the extension of these contracts. The adjustment of the formulæ which the General Manager had explained had been extremely anxious and difficult work. If ever there was a Board overwhelmed with anxiety, it was this Board, because there were nine different townships in France all depending on this, and all more or less afflicted and affected by the operations of the war. Everyone deserved the very best praise and thanks of the Directors and shareholders. The Company always took care to reward their chief men in France whenever they accomplished any work of definite importance, and the Directors would be able to tell the shareholders next time that they had dealt with the whole of the staff. He felt that a generous policy on the part of the Board, as alien Directors, was the best policy they could pursue.

Mr. BRADSHAW seconded the resolution, which was passed.

Mr. WILLIAMS, on behalf of the staff, returned thanks. He knew how everybody had worked, and would convey the vote of thanks, particularly to those abroad, who would appreciate it. He took the opportunity of saying that he would be only too glad to answer questions if the shareholders would visit the office or would write to him, though he preferred that they should visit him, because one could explain matters so much better verbally. It was one of the things he and his staff were there for, and they were only too glad to give information.

Mr. LONG proposed a vote of thanks to the Chairman and Directors for the way in which they had managed the affairs of the Company. He remembered the Company many years ago, and had always heard the management spoken of as being most excellent. Considering all the trials they had gone through in the past few years, they were deserving of the greatest thanks for the way in which they had come through these difficulties. There was reason to hope for better things in the future. The vote of thanks was carried unanimously, and the CHAIRMAN expressed the indebtedness of the Board.

Kenilworth Gas Company.—At the annual meeting of the Kenilworth Gas Company, Mr. Henry Miles (the Chairman) moved the adoption of the accounts and the payment of dividends of 5 p.ct., less tax, upon the ordinary and the preference stock. The revenue account showed receipts totalling £12,030, and there was a profit of £973 on the year's working.

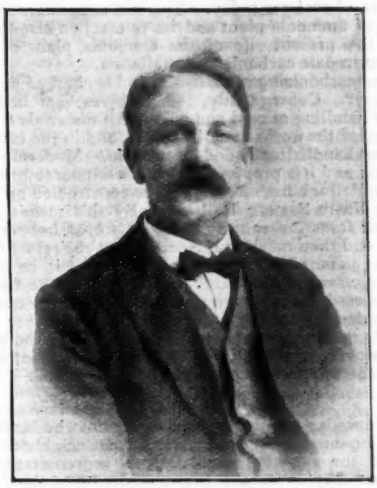
Buxton's Gas Profits.—The Buxton undertaking has had another successful year; and the annual accounts prepared by the Gas Engineer (Mr. Shaw) show a net profit of £5768. As a result chiefly of the contribution from the gas profits, the rates of Buxton have again been reduced by 4d. in the pound. Altogether the gas undertaking has provided over £170,000 in relief of rates.

Bournemouth Capital Issue.—The tenders for the 7000 £10 new ordinary (sliding-scale) shares in the Bournemouth Gas and Water Company which Messrs. A. & W. Richards offered on behalf of the Directors were opened last Wednesday. The issue was fully subscribed at prices ranging from £15 down to the minimum of £13 5s., and the average price of allotment was £13 9s. 8d. per share.

A CENTURY OF GAS AT MANSFIELD.

Hand Labour to be Superseded.

Exactly a quarter-of-a-century after Murdoch, the inventor of gas lighting, had demonstrated that his project was practicable, the Mansfield Gas Light Company was formed with a capital of £5000 in £25 shares. This was in 1823, and a year later the Company were endeavouring to fulfil one of the conditions set forth in a quaintly-worded ordinance that "streets, &c., shall at all times be better and cheaper lighted than could be done by oil." Thus it came about that on Thursday of last week the Mansfield Town Council celebrated the centenary of gas lighting in the borough, the population of which has to-day increased six-fold A hundred years ago the Company boasted



Alderman T. SMITH,
Chairman of the Gas Committee.

one gasholder of 18,000 c.ft. capacity, and the illuminant was supplied at 10s. per 1000 c.ft., subject to certain discounts for prompt payment. To-day—while the plant is admittedly far from modern—the retort-house has seven beds of horizontals, with a capacity of 700,000 c.ft. of gas per day of twenty-four hours. There is also carburetted water-gas plant, by Messrs. Humphreys and Glasgow, capable of making 330,000 c.ft. of gas a day.

In the far-off days of 1824, the pipes used for the conveyance of gas in Mansfield may have been, owing to the proximity of Sherwood Forest, of wood. This surmise is strengthened by the fact that some years ago, during excavations at the gas-works, three or four bored tree trunks having the ends bound with hooped iron were discovered. A copy of the first balance-sheet of the Company, issued for the half-year ended Dec. 31, 1830, states that the profit for that period was £233 8s. 7½d., and was applied to paying a 5 p.ct. dividend. Application was made by the Company to Parliament in 1852 for power to enlarge the works, to increase the capital to £15,000, and to fix the maxi-

Mr. JAMES GIBSON,
the Gas Engineer.

mum price of gas at 6s. 6d. per 1000 c.ft. Under the powers obtained, the old works were discarded, and new and larger plant erected on the present site. The governing body of the town in 1878 obtained parliamentary powers to purchase the undertaking from the Company, and to extend the area of supply. The price paid was £37,400. Thus for 46 years the works have been carried on in the interest of the rate-

payers; and from an estimate in 1831 of 3 to 4 million c.ft. a year, the anufacture of gas has grown to 239 millions.

So much for the present and the past; what of the future? The rapid growth of Mansfield, within comparatively few years, from a quaint agricultural town to an important industrial centre, and the influx of population consequent upon the exploiting of the mineral resources of this and the surrounding area, are matters of common knowledge. The time having now come when the still further development of the coal-field is actually in progress, the Gas Committee have taken the wise step of making provision to meet the demands likely to be made on the plant for many years to come. For this purpose the Mansfield Gas Order, 1924, provides for the extension of the limits of supply so as to include the village of Clipstone, a new and developing area; the acquisition of additional lands for gas-works purposes; and the sale of gas on a thermal basis. The intention is to proceed immediately to remodel and enlarge the plant, and so render it capable of dealing with 1¼ million c.ft. of coal gas a day. This will necessitate the removal of the sulphate of ammonia plant and its re-erection elsewhere, and the erection on the present site of the ammonia plant of a new and thoroughly up-to-date carbonizing installation.

The existing carbonizing plant is old, and is charged and discharged by hand labour. Consequently, this involves very heavy costs for labour in the handling of coal and coke. All materials either brought in or taken out of the works must be carted, and in the case of coal and coke these are handled over and over again. Modernized plant will obviate all this, and it is proposed to instal a telpher to bring coal direct on an overhead track from a siding to be constructed on the adjacent London and North-Eastern Railway. By this means coal will be brought direct from the railway truck to a coal hopper outside the retort-house, and then taken to hoppers above the retort benches, and charged direct as required. In like manner coke will be transferred to bunkers, or conveyed by the telpher to trucks on the railway siding. It is also proposed to put down water-cooled condensers, the present air-cooled condensers having become totally inadequate to meet the demands made upon them. A tar and liquor tank of 200 tons capacity is also to be provided. With these extensions, the plant will be sufficient to meet the requirements for many years to come.

Thursday's Celebration.

Early on Thursday evening, the members of the Mansfield Town Council, accompanied by representatives from neighbouring authorities, inspected the gas-works, and later a representative company, numbering over fifty, were the guests at dinner of the Chairman of the Gas Committee (Alderman T. Smith) and members of the Committee. Alderman Smith, who has been a member of the Gas Committee for two decades, and Chairman for fifteen, presided.

Sir Albert Ball (Nottingham) proposed the "Mansfield Corporation Gas Undertaking," and complimented the borough upon the continued prosperity of the concern, the consumption having increased from three-quarters of a million c.ft. in 1824 to something like 240 millions last year. This was undoubtedly a record to be very proud of, and it was a wise policy on the part of the old Improvement Commissioners to acquire the undertaking from the Gas Company in 1878. Gas undertakings had not yet finished; their era of prosperity was not over. He believed they would have as great prosperity in the future as in the past. The gas engineers in this country would rise to the occasion, if authorities would go in for more research work, and not be afraid of spending money to employ the best chemists and encourage education. There was room for gas and electricity undertakings to work side by side for the benefit of the community. He felt that in 25 years' time the whole of the present system of generating electricity would be obsolete, and that electric current would be generated by gas produced by carbonizing coal. He was satisfied that in the years to come the system of treating coal would be entirely altered.

Alderman Smith, responding, gave an instructive history of gas lighting. Alluding to the progress of the industry locally, he compared the original £5000 capital of the Gas Company with the capital value of the undertaking to-day—£150,000. Of that sum, £90,000 had been repaid and large reserves formed. He paid tribute to the Gas Engineer. No undertaking, he said, could possibly have a more conscientious, hard working, or capable head than Mr. James Gibson; and he, as Chairman, never wished to work with a better example of an English gentleman. Mr. Gibson had devoted himself whole-heartedly to the town's service.

The Mayor of Mansfield (Mr. J. Harrop White) replying to "The Town and Trade of Mansfield," proposed by County Alderman J. S. Alcock, said they were fortunate in possessing an electricity undertaking as well as gas. It was possible to run both the concerns satisfactorily and successfully for the benefit of the town. They had found that the electricity undertaking had not materially detracted from the prosperity of the gas-works.

The only other toast submitted was that of "Neighbouring Local Authorities," by Alderman D N. Maltby, which was acknowledged by Mr. W. J. Board (Town Clerk of Nottingham), and Mr. W. Collins (Chairman of the Sutton-in-Ashfield Gas Committee).

Imperial Continental Gas Association's German Claim.

The Directors of the Imperial Continental Gas Association announce that they have received from the Clearing Office (Enemy Debts) a sum of £566,700, being a fourth instalment (less commission) in respect of the compromise award of £1,550,000 on account of the outstanding balance of the Association's German claim under the Peace Treaty. Of this instalment, £386,917 represents a realized accretion to capital. This sum, together with the undistributed balance of previous instalments, will permit of a special distribution at the rate of 19½ p.ct. The necessary resolution will be submitted at the general meeting in May next. As on the occasion of the previous distribution out of the sums representing realized accretion to capital, no liability attaches either to the Association or to the stockholder in respect of income or super tax. The balance of the above instalment—that is, £179,784—being revenue, will be included in the Association's revenue accounts for 1924, which will be submitted at the general meeting in May next.

NEW DEVELOPMENT OF MESSRS. ALDER AND MACKAY, LTD.

Opening a Branch in Belfast.

The opening by Messrs. Alder and Mackay, Ltd., Gas Meter Manufacturers, Edinburgh, of a North of Ireland Branch was the occasion of a pleasant function in Belfast on Thursday, July 3.

The Vice-Chairman of the Gas Committee of the Belfast Corporation, Councillor Hugh M'Laurin, J.P., accompanied by Aldermen and Councillors of the City, Mr. James D. Smith, M.Inst.C.E., J.P., the Gas Engineer, and other City Officials, were received at the new works at No. 34, Alfred Street, by the Company's Chairman, Mr. J. Miller Thomson, and the Directors. An interesting and instructive half-hour was spent in the works, which are well equipped in the most modern manner.

Thereafter the guests were entertained to luncheon. Mr. Miller Thomson presided, and was supported by his colleagues on the Board—viz., Mr. W. Grant, Mr. Joseph Bennet, and Mr. Harold Bennet. There were also present Mr. Stanley Bennet and Mr. George Cruickshank (the Manager of the branch in Belfast).

Councillor M'Laurin, in giving the toast of "Alder and Mackay, Ltd.," expressed his pleasure at having been present at the inauguration of the branch which the firm stated was warranted by their valuable connection with the gas undertakings in Northern Ireland. He was glad to say that for many years Messrs. Alder and Mackay had been supplying meters to the Corporation of Belfast, and these had always given the utmost satisfaction. He remarked on the fact that the firm were not only repairing meters in Belfast but were also assembling new meters, thereby helping to provide much-needed work for the unemployed craftsmen in the city. In alluding to the new gas-meter testing station being established by the Local Authority, he expressed the hope that the Company would find it of assistance to them. He wished them all prosperity in their latest enterprise.

Mr. Thomson, in acknowledging the toast, said that as strangers in a strange land it had occurred to them to mark the opening of the new branch by inviting a few friends to inspect it; and they were very grateful for the interest that had been taken in their venture. In giving the history of the Company, Mr. Thomson explained that the business was begun by the late Mr. Henry Alder in May, 1850, so that it was not a firm of mushroom growth but one that had behind it the experience of nearly three-quarters of a century. In that period the business had prospered, and in addition to the central works in Edinburgh, there were important branches in London, Bradford, Sydney, N.S.W., Wellington, N.Z., and now in Belfast. The branch in Belfast had been contemplated before the war, but unfortunately that world cataclysm held up the project. No business could afford to stand still, and as business men they fully appreciated the fact that the Belfast Corporation, with the able assistance of their distinguished Gas Engineer, Mr. James D. Smith, had so expanded as to bring the gas undertaking in Belfast to the front. They had noted the fact that the gas made last year amounted to the huge total of 3567 million c.ft., an increase on the previous year's make of 249 millions, which was in excess of the total make of many of their very good customers. Other undertakings in Ireland were also showing remarkable development. He was very pleased to be able to say that they had been successful in securing locally the skilled workmen of the very type required. Other circumstances which induced the firm to open a branch were the difficulties of transport between Edinburgh and Ireland, and the decision of the Belfast Authorities to open a stamping station in their City; and he hoped that Alder and Mackay might be substantial contributors to the revenue of that department. He pointed out the hereditary connection of the present members of the Board with the founders of the firm, and stated that the policy of the firm had always been to produce an article of first quality. The present Board intended to maintain that policy; and with a fair field they had every hope of success. The Chairman proposed the toast of "The Corporation of Belfast," and coupled with it the names of Alderman M'Connell, M.P., Alderman Jamieson, and Mr. James D. Smith, all of whom suitably replied.

Mr. Grant proposed the health of the Corporation Officials, which was responded to by Mr. M'Cormick, the Town Solicitor, and Mr. Cleland, Superintendent of the Distribution Department.

The proceedings were brought to a close by the toast of "The Chairman," given by Alderman Jones, and heartily endorsed by all.

TRADE NOTES.

The Staveley Coal and Iron Company, Ltd.

An interesting booklet descriptive of the works of this well-known firm has recently been published. It is excellently illustrated, and gives an insight into the huge capacity and modern construction of the Company's works at Chesterfield.

The British Aluminium Company, Ltd.

A new booklet (No. 2a) on "Hints on Working Aluminium," brought out by this firm, deals with aluminium sheet, strip in coil, and circles. It includes in its data hints on temper, press work, metal beating, spinning, jointing, and finishing. As in other issues, the booklet is of pocket size for handy reference.

Messrs. Stothert and Pitt.

Messrs. Stothert and Pitt, Ltd., of Bath, inform us that the resignation of their Chief Engineer, Mr. C. M. Toplis, will not affect the manufacture of their patent horizontal luffing cranes ("Toplis" patents); the sole interests and any subsequent improvements in the patents being assigned exclusively to them.

The newly formed social club in connection with the Blackburn Corporation Gas Department is proving popular, and the membership is rapidly increasing A bowling green has been provided, and there are also tennis courts and a cricket ground; while the laying out of a football pitch is in contemplation.

MERSEYSIDE GAS SUPPLY.

A valuable supplement to the "Liverpool Daily Post" has been published in co-operation with the Liverpool Chamber of Commerce, under the title of "The Ambassador of Commerce," for the City and Port of Liverpool and the adjoining boroughs. Among the mass of useful information it contains is a page devoted to the Merseyside gas and electricity supplies, and their ample provision for industrial requirements, together with another page advertising the capacity of the Liverpool Gas Company to meet local needs in this respect. From the information published regarding gas we take the following.

As regards lighting, heating, and cooking, the gas undertaking of Liverpool, which is privately owned, is standing up splendidly to the rivalry of the electricity undertaking, which is municipally controlled. The Liverpool Gas Company is the largest of the kind outside London, and the fifth largest in the United Kingdom. Its importance may be seen from the following figures: Capital £3,200,000, subscribed by over 6200 persons; population of supply area, 942,000; meters in use, nearly 200,000; cookers and fires rented from the Company, 65,000; fuel consumed annually, 400,000 tons of coal, 60,000 tons of coke, and 10,000 tons of petroleum. Liverpool has enjoyed the benefit of an uninterrupted supply of gas for well over a century, and without doubt this continuity of supply, especially in view of the frequent industrial disturbances of recent times, has been an asset of enormous value to industry, trade, and domestic life. Gas is at present used in Liverpool in as many as 64 primary trade processes, and in nearly 3000 distinct trades averaging at least seven processes each. Expert advice on the application of gaseous fuel to industrial uses is always at the disposal of consumers, present or prospective. The price of gas supplied through ordinary meters is 7·4d. per therm (approximately 2s. 11d. per 1000 c.ft.). For large consumptions, discount ranging from 2½ to 10 p.ct. (according to quantity) is allowed, and by arrangement the consumptions in different premises of the same consumer may be aggregated for discount purposes.

WALLASEY.

The Wallasey Gas-Works is a modern undertaking, covering about 14¾ acres, with a total carbonizing capacity of 480 tons of coal per 24 hours. The output of gas during the past year was 942 million c.ft.; coal carbonized, 59,972 tons; coke made, 37,483 tons; sulphate of ammonia, 695 tons; tar, 850,295 gallons. The gas consumers numbered 20,219; cookers, 15,508; and fires and other appliances, 8468.

BIRKENHEAD.

The Birkenhead gas undertaking was established by a private company in 1841, and was acquired for the town in 1858. The output of gas in 1858 was 67 million c.ft., and this has increased until at the present time the annual output totals 1200 million c.ft. The undertaking uses 80,000 tons of coal a year, and 700,000 gallons of oil. Gas is furnished to about 35,000 consumers. The Gas Department supplies cookers, gas-fires, and other apparatus on advantageous terms. Consumers are given good service, and all steps are taken to ensure an efficient supply.

WIDNES GAS SUPPLY.

Widnes gas has long been famous for its cheapness, and without doubt this cheapness, combined with its excellent quality, has had an important effect on the development of the town as an industrial centre and as the metropolis of the alkali trade. Up to 1876 the Widnes Gas-Works were privately owned, but in that year they were acquired by the town under a local Act of Parliament. To meet the increasing demand for gas for both trade and domestic purposes, the works in Ann Street East have been reconstructed and enlarged, and two gas-holders have been erected at Ditton for distribution purposes. The quality of the gas is of a high average, while the prices charged are stated to be the lowest in the world. Large consumers are dealt with on very advantageous terms, with the result that several of the big chemical manufacturers find gas-heated furnaces a good commercial proposition. For motive power and furnace purposes the prices charged for gas range from 1s. 8d. to 1s. 3d. per 1000 c.ft.; and for domestic and industrial uses from 2s. to 1s. 10d., according to the quantities consumed. The Corporation supply gas not only to the borough, but also to the neighbouring townships of Bold, Cronton, Hale, and a part of Halewood.

BAHIA BLANCA GAS COMPANY, LTD.

Annual General Meeting.

The Seventeenth Ordinary General Meeting of the Company was held at the London Offices, Dashwood House, New Broad Street, E.C., last Wednesday, when Mr. J. M. MACMORRAN (the Chairman), who presided, opened the proceedings by referring with regret to the sudden death, on June 27, of Mr. A. M. im Thurn, who had been a member of the London Board since 1910.

Presenting the report and accounts, which were adopted, the Chairman pointed out that it would be seen from the revenue account that there had been a loss of £8639, thereby making the total deficit to the date of the account (Dec. 31) £57,363. During 1923 there was a loss on working in Bahia Blanca of £1156. This was better than 1922 by £1594, but, on the other hand, interest on the 6 p.ct. participating debenture stock was cumulative as from Jan. 1, 1923, and this amounted to £5400 for the year. On balance these two items gave an increased debit of £3806, which, with interest and discount £453, practically accounted for the increased loss shown when the figures were compared with those for 1922. The amount of gas sold in 1922 was 628,978 cubic metres, whereas the figure for 1923 was 629,619 cubic metres—a difference of only 641 cubic metres, or an increase of (say) one-tenth of 1 p.ct. With this in mind, it was satisfactory to note that there were substantial decreases in manufacturing and distribution costs. Maintenance of public lamps was down, as were rates and taxes and management in Bahia Blanca. On the credit side of the account the only item calling for comment was sale of gas, which at £12,254, was £352 less than the figure for 1922. This decrease was due to the fact that for the first five months of the year 1922 they were charging 30 cents per cubic metre for gas, which was reduced to 25 cents as from June 1, 1922.

The greatest problem the Board had with this business was largely to increase their sales. They had during the year under review continued their policy of giving a highly efficient service at the lowest possible price, and on April 1 last a further reduction was made in the price of gas. This reduced tariff had been designed specially with a view to attracting the domestic consumer; and reports since April were of an encouraging nature. A decision upon this question was only arrived at after very careful consideration, because, while it was most important that they should increase the gas sales, it was just as important that they should cover their expenses. During 1923, Mr. A. M. Hunter (the Engineer and Manager in Bahia Blanca) came to England on leave. He had not been home for a very long time, but even so they had the greatest difficulty in getting him to leave the business in the care of somebody else while he had a well-deserved holiday. This showed how much their Engineer had the Company's interests at heart. While Mr. Hunter was over here he visited a number of gas-works in this country, and in addition the Board took advantage of his presence to settle many matters of importance.

With regard to the working in Bahia Blanca, the Board had continued their efforts to increase the sales of gas, but until the last reduction came into force there was no doubt that the price was too high. The lighting business continued to go backward rather than forward. Though this was very disappointing, they must remember that the supply of gas for cooking purposes accounted for the greater portion of the sales. They did not find it easy to place gas fires and radiators, because in Bahia Blanca the cold weather only lasted for a short time, and also because many of the houses there were constructed without chimneys in the living-rooms. With regard to cooking, however, they had been more successful, particularly in cafés where quantities of hot water were wanted quickly. In addition, there had been an improvement in the number of gas cookers in service. There was no doubt that their future was with cooking and the rapid heating of water, and they continued to concentrate on this phase of the business. The Board had received a telegram, handed in at Bahia Blanca on July 7, to the effect that unaccounted-for gas had been reduced, and that improved returns were expected shortly, because the reduction in the price of gas had caused a good impression. The year under review had been a comparatively uneventful one, considering the times they had passed through since 1914; but unfortunately those war years left the Company with a greatly reduced consumption. The thing to do now was to increase the gas sales.

No Hands Wanted.—A placard is displayed outside the mantle factories of the kingdom headed "No Hands Wanted." It measures 40 ft. by 20 ft., and is part of a publicity campaign of the British gas-mantle makers to draw attention to the injury to their trade which they fear as a result of the removal of the Safeguarding of Industries Act in August.

Coal Bye-Products in Natal.—At the annual meeting of the Natal Chamber of Industries in Durban, Mr. F. Goodall (the Chairman) said that the coal bye-product plants which had been established in Natal during the past two or three years were steadily extending. At the present time they manufacture coke, tar, pitch, naphthalene, creosote, and sulphate of ammonia.

New Preference Stock for Redhill.—It will be seen from our advertisement columns that Messrs. A. & W. Richards are offering for sale by tender £20,000 of 5½ p.ct. irredeemable preference "A" stock in the Redhill Gas Company. The minimum price of issue is £95 per £100 of stock, at which the yield will be £5 15s. 9d. p.ct. The capital is required for extensions of the works and plant rendered necessary by the increasing demand for gas. Tenders must be sent in to Messrs. Richards, at No. 37, Walbrook, E.C., not later than Thursday morning, July 24.

Colonial Gas Association.—The Colonial Gas Association, Ltd., have recently concluded arrangements for taking over, as from Jan. 1, 1924, the undertaking of the Williamstown Gas Company, near Melbourne, whose area adjoins the area of the Footscray Company, one of the Association's works. Under the agreement, the Association will issue 51,750 fully paid ordinary shares to the shareholders of the Williamstown Company, being equivalent to 18s. per share on the Williamstown Company's share capital of £57,500. For the year ended Dec. 31, 1923, the Williamstown Company sold 86,000,000 c.ft. of gas, and the trading profit for that period was £10,100. It is intended to connect the Williamstown district with the Footscray works. In order to cope with the continued development of the Company's business, the Directors have recently made an issue of debentures to the extent of £55,000, the whole of which has been taken up in Australia.

Co-Partnership at Chester.—There has been a successful first annual meeting in connection with the Chester United Gas Company's co-partnership scheme. The scheme is not entirely new, but is a reformation under the provisions of the Chester Gas Act, 1922, of the old profit-sharing scheme which existed prior to the war. The chair was occupied by Sir John M. Frost (the Chairman of Directors), who was supported by Mr. J. H. Noble (the Engineer and Manager) and Mr. H. Hopkinson. In their report for the past year, the Committee stated that under the provisions of the old profit-sharing scheme no bonus would have accrued in respect of 1923, but the Directors had prepared, and obtained the sanction of the proprietors to, a co-partnership scheme under the provisions of the Company's Act of 1922. Owing to the successful management of the Company's affairs and to reductions in cost of materials, the Directors had been enabled during 1923 to sell gas below the basic price, and as a consequence they recommended the distribution of a bonus of 6½ p.ct. on the salaries and wages of co-partner employees, and the payment of an extra dividend of ½ p.ct. on the ordinary stock of the Company. The Committee felt much gratified that the Directors had so soon brought the scheme into operation, and they appealed to all employees to assist in justifying this action by maintaining a keen interest in the prosperity of the Company.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

While there is as yet no increase in business, and no better demand for supplies, the week just ended showed, perhaps, slight indications of a better tone in the market. Whether this will develop into improved trade remains to be seen. No special cause can be assigned to it, unless it be that consumers are realizing that prices have touched bottom. Certainly there has been more inquiry, if not for prompt coals, at any rate for forward contracts. But collieries are not inclined to quote current rates for long periods ahead, so that business is difficult to arrange.

There is still much idle time, and it is only those collieries which have higher-priced contracts still running to average up with current sales that can keep working full time.

Best gas is still quoted at 22s. 6d. to 23s. f.o.b., but most brands are obtainable for early shipment at lower figures. For such positions as September-December, however, sellers are not inclined to offer at lower prices. Other gas makes remain at about 19s. 6d. to 20s. 6d., and are in plentiful supply.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

The Yorkshire and Lancashire markets continue to be decidedly weaker in practically all directions, and collieries generally are working shorter time, although some of the larger pits are making a higher average than the others. A few house coals of the better descriptions have been put into stock, but the quantity is limited.

Gas coals do not appear to be fetching the contract figures that were anticipated some weeks ago, although they are in advance of those of last year. Deliveries are naturally on the small side, owing to the warmer weather.

Industries are sluggish, and stocks are being used up, while in the near future local holidays will still further retard output. The shipping outlook is dull; inquiries from abroad being limited, and the figures exceptionally low, possibly in view of the fact that the nearer continental countries, including Germany, are producing considerably above their free quantity of fuel. Higher rates of exchange are also once more against business in English ports; and although some unforeseen circumstances may arise, there does not appear to be a favourable opinion as to business during the next two months.

Prices at Hull at the week-end were: Bunkers—Yorkshire, Derby, and Notts large screened steam, f.o.b. Humber ports, 20s. to 21s. Cargo for export, f.o.b. usual shipping ports—Best Yorkshire hards, Association, 22s. 9d. to 23s.; Derby best hards, 23s. to 25s.; West Yorkshire Hartleys, 21s. 6d. to 24s.; South Yorkshire washed doubles, 20s. 6d.; South Yorkshire washed singles 20s. 6d.; dry doubles, 16s. to 16s. 6d.; South Yorkshire washed smalls, 15s. 9d.; Derby slack, 1 in., 14s.; South Yorkshire rough slack, 14s. 3d. to 14s. 6d.; gas coke, 34s. 6d. to 35s. 6d.; foundry furnace coke, 24s. 6d. to 25s.; washed smithy peas, 23s. to 28s.; washed steam thirds, 19s. 9d.; South Yorkshire washed trebles, 22s. per ton.

Prices have not altered at the Lancashire collieries, but "foreign" coal is coming in at lower figures. For best Lancashire house coal from 33s. to 34s. at the pits is quoted, and for slacks from 12s. to 17s., according to quality.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

Negotiations are still proceeding with regard to some outstanding contracts for gas coal; but the year's requirements are now arranged for, except in a very few cases. Collieries, like those of North Staffordshire, which have to carry disproportionately high costs, were placed in a dilemma by the acceptance of the old contract prices by big organizations in South Yorkshire without reference to the increased wages bill which has to be faced. Sufficient outlets were to be secured only by falling into line. Those collieries which hesitated awhile gave way just soon enough to get contracts about equal to those of last year. Within their local radius, where they could not be reached by external competition, they obtained a certain measure of indemnification for their increased outgoings. There is more movement in household coals. It is less apparent among consumers than among merchants, however. Warned by their experiences last winter, merchants who can do so are putting more coal into stock. There is actually some stringency in particular grades, albeit an advance of price in rare cases is no more than a signal that special lines have been sold out for the time being. The spurt, limited though it is, involves unbalancing of the trade in D.S. nuts and slack. With a slow demand from industrial consumers individual collieries have been forced to clear accumulations of smalls at cut prices, as there was a threat of work at the pits being stopped by shortage of trucks.

A valuable seam of coal 5 ft. 2 in. thick has been struck at the Thorne Colliery of Messrs. Pease and Partners, Ltd., at a depth of 860 yards.

The Clowne Council have discussed the question of lighting the streets of the district with gas or electricity during the coming winter. They decided to ask the Shireoaks Gas Company to tender for the lighting of 100 lamps by gas.

At the conclusion of the business at the monthly meeting of the Farnborough Urban District Council last week, the members went into committee to consider the report of Mr. Valon on the accounts of the Aldershot Gas Company for the year ended Dec. 31 last.

GAS REGULATION ACT, 1920.

BOYS' CALORIMETER

CALORIMETERS

PRESCRIBED BY

The Gas Referees

ARE

MANUFACTURED

:: PRINCIPALLY ::

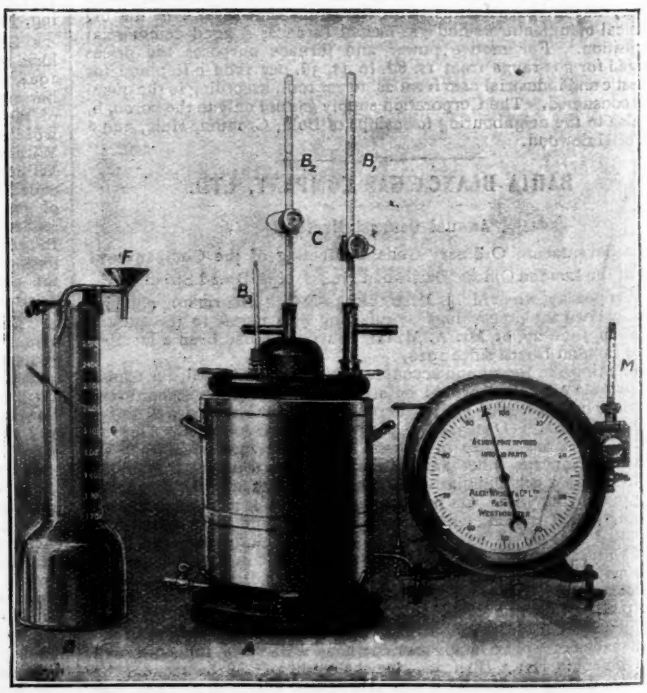
BY

ALEXANDER WRIGHT

& CO., LTD.,

1, WESTMINSTER PALACE GARDENS,

WESTMINSTER, S.W. 1.



CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 15.

There is nothing of fresh interest to report in the London tar products market, the position being very much as mentioned last week. Business is quiet all round, as is usual about this time of the year.

Tar Products in the Provinces.

July 14.

The average values for gas-works products during last week were: Gas-works coal tar, 43s. to 48s. Pitch, East Coast, 55s. to 57s. 6d. f.o.b. West Coast—Manchester, 50s. to 52s. 6d.; Liverpool, 51s. to 52s. 6d.; Clyde, 52s. to 55s. Benzole 90 p.ct., North, 1s. 5d. to 1s. 6d.; crude 65 p.ct. at 120° C., 1s. to 1s. 1d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 8d. to 1s. 10d. Toluole, naked, North, 1s. 5d. to 1s. 6d., nominal. Coal tar crude naphtha in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 5d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, liquid, 6½d. to 6⅝d.; salty, 5½d. to 5⅝d.; Scotland, 5½d. to 5⅝d. Heavy oils, in bulk, North, 9d. to 9½d. Carbolic acid, 60 p.ct., 1s. 10d. to 1s. 11d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

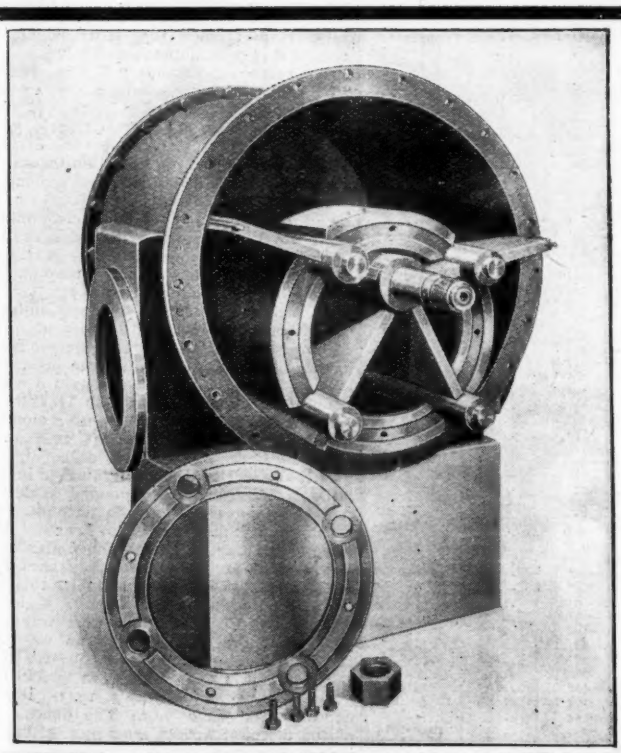
Coke-Oven Gas for Wombwell.—The Mitchell Main Colliery Company have contracted to supply to the Wombwell Urban District Council crude gas at the price of 7d. per 1000 c.ft.; the Company to bear the cost of laying the pipeline from the coke ovens to the Council's gas-works. It is believed that the quantity of gas available will be sufficient for all the needs of the gas undertaking.

Coke-Heap Fire at Plymouth.—The staff of the Plymouth and Stonehouse Gas Light and Coke Company had a busy time at their works on Sunday, endeavouring to subdue an outbreak of fire which occurred in a heap of 200 tons of coke. It transpires that the coke was found smouldering last Thursday, and that since then the men had been removing it in order to get at the seat of trouble. Several firemen augmented the works staff on Sunday in directing hoses on the smouldering mass.

Salford Gas Report.—The report of the Salford Corporation Gas Committee for the year ended March 31 stated that, despite bad trade and the competition of electricity, the sales show an increase of 6·16 p.ct. After the usual contribution of £12,090 towards the rates, there is a balance of £1413 to transfer to the reserve fund. The coal carbonized during the past year amounted to 131,165 tons, as compared with 125,030 tons for the previous year—an increase of 6135 tons. The quantity of gas made was 1,813,087,000 c.ft., as compared with 1,725,713,000 c.ft. for the previous year. This is a record which has not previously been equalled in the history of the undertaking.

Ossett Gas Results.—Mr. Arnold E. Mottram, Engineer and Manager of the Ossett Corporation Gas Department, in his twenty-third annual report, states that during the year 172,745,000 c.ft. of gas were made and received, and 152,934,000 c.ft. sold—an increased make of 9,559,000 c.ft., and an increased sale of 7,736,400 c.ft. The unaccounted-for gas was 12 p.ct. The gross profit for the year is £14,420. Interest and sinking fund charges amount to £12,123, leaving a profit of £2297 on the year's working. They had a loss of £1744 on last year's working, and have paid this off this year. The total saving on this year's working was £4041 over last year. The interest and sinking fund charges are still very heavy and account for half the total expenditure. By not adding to them during the year, and by increasing the sale of gas, it has been possible to reduce the price of gas by 1½d. per 1000 c.ft. It is probable that this item will be further reduced by several pence per 1000 c.ft. during the next two or three years. It has not been necessary to work the retort house during the year. The Tully plant has been worked during the winter months, but only to the extent of 4 p.ct. of the total gas sent out. The Crigglestone supply has been well maintained, and the quality satisfactory. The chief savings have been £1000 each on manufacture of gas and repairs to meters, £600 on mains, and £500 on the works. Consumers by ordinary meters number 4692, and by slot meters 4240.

Welsbach Light Company, Ltd.—At the annual meeting of the Company to-morrow (Thursday), the Directors will submit the accounts for the year ended March 31 last, and will report that conditions in the gas-mantle industry during the year have been difficult, and foreign competition has been severe. The intention announced by the Government to allow the provisions of Part II. (Depreciated Currencies) of the Safeguarding of Industries Act to lapse on Aug. 19 next is deeply regretted. The duty of 33⅓ p.ct. imposed on German mantles imported into this country will then cease. The small duty affecting all imported mantles under Part I. (Key Industries) will apparently continue for a further period of two years. The efficiency of the general organization of the Company has been maintained and strengthened, and the policy of the Board in extending the operations of the Company into ancillary lines of goods is making steady progress. The lease of the Company's premises in Leeds having expired, the Board acquired an important freehold property, No. 46, Park Place, in that city. The improved facilities thus provided have already resulted in increased business in the area served from this centre. The net profit, after taking into account the settlement with the Inland Revenue authorities (viz., recovery of excess profits duty, less taxes referred to in the profit and loss account) amounts to £24,397. To this must be added the balance brought forward from last year, £17,945, making a total to the credit of profit and loss account of £42,342. The Directors recommend the payment of a dividend of 5 p.ct. (less income-tax) on the issued share capital (£12,896), and the transfer to general reserve (including discount on debenture stock redeemed during the year) of £6480, leaving a balance to be carried forward (subject to income-tax and corporation profits tax) of £22,966.



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STOCK MARKET REPORT.

The impression that there would be an immediate rise in the Bank rate is gradually subsiding. The Bank of England Directors refuse to be stampeded, and the views expressed by manufacturers (as evidenced by the appeal of the Federation of British Industries in their letter to the Court) lead one to believe that there will be no artificial rise in money rates. The good relations existing between the British and French Premiers also gives satisfaction.

With the approach of the holiday season, markets generally were on the dull side. Sound investment stocks remained firm, and there is little to record in such markets. There was more activity in the Miscellaneous and Industrial markets, especially in Tobaccos and Textiles, Imperials, British American, and United, the quotations of which were all marked up. Improvements also occurred in Amalgamated Cotton, Bradford Dyers, Calico Printers, and others.

The feature of the Gas Market was the announcement (to which we referred last week) of the further distribution to the stockholders in the Imperial Continental Gas Association. The Directors announce there will be a special distribution at the rate of 19½ p.ct., which, however, will not take place until May of next year, as it requires a special resolution of the stockholders. The stock rose a further 2 points on the week. The first of the half-year's dividends have been announced; Brentford 6$\frac{1}{16}$ p.ct. p.a. on the "A" stock and 6$\frac{1}{8}$ p.ct. p.a. on the "B" stock are at the same rates as the corresponding half-year 1923; and the rates on the Wandsworth stock have been advanced by 1s. 9d. p.ct. p.a. on the "C" and New stock, and 2s. 6d. p.ct. p.a. on all the other classes of stock.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. July 11.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
131,978	Stk.	Feb. 7	5	5	Aldershot 5 p.c. max. C.	81—84	..	82
235,492	,,	,,	4	4	Do. 4 p.c. Pref.	70—73	..	..
1,551,868	,,	Apr. 3	5½	6	Alliance & Dublin Ord.	63—68	..	64—64½
374,000	,,	July 10	4	4	Do. 4 p.c. Deb.	60—65*	..	..
280,000	5	May 22	8	8	Bombay, Ltd.	5—5½	..	5$\frac{7}{16}$
100,000	10	Mar. 6	8½	8½	Bournemouth 5 p.c.	12½—13½	..	..
383,110	10	,,	7	7	Do. B 7 p.c.	12—13	..	12$\frac{1}{16}$
150,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	11½
50,000	Stk.	June 26	3	3	Do. 3 p.c. Deb.	54—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	74—79	..	..
992,045	,,	July 10	6$\frac{1}{16}$	6$\frac{1}{16}$	Brentford A Con.	98—103*	−2	103½
990,500	,,	,,	6⅛	6⅛	Do. B New	98—103*	−2	100—103½
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	87—92*	−2	91
306,690	,,	June 12	4	4	Do. 4 p.c. Deb.	75—80	..	..
181,337	,,	,,	—	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	102½
214,740	,,	Mar. 6	11	11½	Brighton & Hove Orig.	170—175	..	..
244,200	,,	,,	8	8½	Do. A Ord.	125—128	..	..
1,287,500	,,	Feb. 21	5	5	Bristol 5 p.c. max.	92—93a	..	90½
855,000	,,	Mar. 20	—	7	British Ord.	117—122	..	117
100,000	,,	June 26	7	7	Do. 7 p.c. Pref.	118—123	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72—77	..	73—74
100,000	10	May 22	6	8	Cape Town, Ltd.	6½—7½	..	..
100,000	10	Apr. 24	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb.	7—76	..	..
626,860	,,	Feb. 21	6	6	Cardiff Con. Ord.	99—102	..	..
237,860	,,	June 26	7½	7½	Do. 7½ p.c. Red. Deb.	102—107	..	..
157,150	,,	Mar. 6	5	6½	Chester 5 p.c. Ord.	88—93b	..	..
1,513,280	,,	,,	6	6	Commercial 4 p.c. Cap.	90—95	..	..
560,000	,,	,,	6	6	Do. 3½ p.c. Cap.	90—95	..	94
475,000	,,	June 12	3	3	Do. 3 p.c. Deb.	56—59	..	..
800,000	,,	14 Jan. 15	—	—	Continental Union, Ltd.	27—32	..	27
200,000	,,	June 12	7	7	Do. 7 p.c. Pref.	75—80	..	77½
660,000	,,	Mar. 6	6½	6½	Croydon sliding scale	101—104	..	..
284,975	,,	,,	5	5	Do. max. div.	84—87	..	..
492,270	,,	Feb. 21	3	4½	Derby Con.	108—110c	..	..
55,000	,,	July 10	4	4	Do. Deb.	74—76*c	..	..
209,000	,,	Apr. 3	5	5	East Hull 5 p.c. max.	..	..	89½
1,002,180	10	Jan. 24	5	2	European, Ltd.	7—8	+½	6$\frac{1}{2}$—7$\frac{1}{2}$
16,503,045	Stk.	Feb. 7	5½	5½	Gas Light & Coke 4 p.c. Ord.	91—93	..	91—92½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	62—65	..	63½—64½
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	80—83	..	80½—81½
4,761,930	,,	June 12	3	3	Do. 3 p.c. Con. Deb.	61—64	..	61½—63
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	190
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Mar. 20	6$\frac{3}{4}$	6$\frac{3}{4}$	Hastings & St. L. 5 p.c. Conv.	91—96	..	..
258,740	,,	,,	5$\frac{1}{2}$	5$\frac{1}{2}$	Do. 3½ p.c. Conv.	76—81	..	..
70,000	10	May 8	10	10	Hongkong & China, Ltd.	16—17	..	..
86,600	Stk.	Mar. 6	9½	10	Hornsey 7 p.c.	143—148	..	..
1,976,000	,,	May 22	10	30	Imperial Continental Cap.	162—167	+2	161—166
263,950	,,	Feb. 7	3½	3½	Do. 3½ p.c. Red. Deb.	69—72	..	..
235,242	,,	Mar. 6	6½	6½	Lea Bridge 5 p.c. Ord.	90—102	..	..
2,127,340	,,	Feb. 21	5½	5½	Liverpool 5 p.c. Ord.	91½—92½b	..	90—92
600,000	,,	Mar. 20	7	7	Do. 7 p.c. Red. Pref.	103—106b	..	105½
165,736	,,	Feb. 21	9	8	Maidstone 5 p.c. Cap.	124—129	..	..
63,480	,,	June 26	3	3	Do. 3 p.c. Deb.	53—58	..	..
75,000	5	,,	5	7	Malta & Mediterranean	3½—3¾	..	..
541,920	Stk.	June 12	4	4	Montevideo, Ltd.	52—57	..	54—56
1,875,892	,,	Mar. 6	4$\frac{7}{8}$	5½	Newcastle & Gateshead Con.	85½—86½d	+½	..
250,166	,,	,,	4	4	Do. 4 p.c. Pref.	75—77d	..	..
529,705	,,	June 26	3½	3½	Do. 3½ p.c. Deb.	70—72d	..	..
15,000	10	Mar. 6	11	11	North Middlesex 10 p.c.	16—17	..	..
75,940	10	,,	7$\frac{7}{16}$	7$\frac{7}{16}$	Do. 7 p.c.	11½—11¾	..	..
300,000	Stk.	May 8	9	7	Oriental, Ltd.	98—101	..	..
138,120	,,	June 26	7$\frac{7}{8}$	7½	Plym'th & Ston'house 5 p.c.	112—117	..	112
60,000	50	Mar. 6	13	13	Portsea Island B	102—105	..	..
100,000	50	,,	12	12	Do. C	98—103	..	..
2,289,909	1	—	—	—	Primitiva Ord.	⅛—¼	..	5/6—6/3
341,400	100	June 2	4	4	Do. 4 p.c. Red. Deb.	69—74	..	..
600,000	Stk.	Jan. 24	4	4	Do. 4 p.c. Red. Deb. 1911	54—57	..	56½
220,335	,,	June 26	4	4	Do. B. Aires 4 p.c. Rd. Db.	54—57	..	..
321,670	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	54—57	..	..
150,000	10	Mar. 20	6	6	San Paulo 6 p.c. Pref.	6½—7½	+½	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	40—42	+2	..
270,000	Stk.	Mar. 20	5	5/8/4	Sheffield A	99—101e	−½	..
419,968	,,	,,	5	5/8/4	Do. B	99—101e	−½	..
1,047,000	,,	,,	5	5/8/4	Do. C	99—101e	..	..
90,000	10	June 12	6	8	South African	7—9	..	..
6,609,895	Stk.	Feb 21	5	6½	South Met. Ord.	98½—100½	..	99—100
102,580	,,	July 10	5	5	Do. Red Pref.	96—98*	−2	..
1,895,445	,,	,,	3	3	Do. 3 p.c. Deb.	58—61*	−1	61
734,000	,,	Mar. 6	6½	6½	Do. 6½ p.c. Red. Deb.	103—105	..	..
91,500	,,	,,	8½	8½	South Shields Con.	136—138d	..	..
1,087,795	,,	Feb. 21	6	6½	South Suburban Ord. 5 p.c.	101—106	..	..
368,837	,,	June 26	5	5	Do. 5 p.c. Deb.	93—98	..	..
647,740	,,	May 8	6	5	South'mpt'n Ord. 5 p.c. max.	85—88	..	86½—87
121,275	,,	June 26	4	4	Do. 4 p.c. Deb.	73—78	..	..
250,000	,,	Mar. 6	7	7	Swansea 7 p.c. Red. Pref.	104—106	..	104½
200,000	,,	June 26	6½	6½	Do. 6½ p.c. Red. Deb.	102—104	..	103½—105
120,000	,,	Feb. 21	8	8	Tottenham District A 5 p.c.	119—124	..	..
882,275	,,	,,	6½	6½	Do. B 3½ p.c.	101—104	..	101—101½
181,255	,,	June 12	4	4	Do. 4 p.c. Deb.	76—80	..	79½
258,251	,,	Mar. 20	5	7/14/4	Tynemouth Con. and New Wandsworth, Wimbledon, and Epsom—	87—89d	..	..
30,000	,,	July 10	9½	9½	Wandsworth A 5 p.c.	132—137*	..	..
235,636	,,	,,	7½	7½	Do. B 3½ p.c.	110—115*	..	..
108,075	,,	,,	6/7/9	6/9/6	Do. C	96—101*	..	..
240,865	,,	,,	6/7/9	6/9/6	New Ordinary	..	..	..
352,000	,,	,,	7½	7½	Wimbledon 5 p.c.	108—113*	..	112
98,000	,,	,,	7½	7½	Epsom 5 p.c.	115—120*	..	118½
88,416	,,	June 26	3	3	3 p.c. Deb.	55—60	..	..

Quotations at:—a.—Bristol, b.—Liverpool. c.—Nottingham d.—Newcastle. e.—Sheffield. * Ex. div.

The following transactions were recorded during the week:

On Monday, Bournemouth "B" 12$\frac{11}{16}$, 6 p.ct. preference 11⅝, Brentford "B" 103, 6 p.ct. Richmond Debenture 102⅜, European 6⅜, Gas Light and Coke 91, 91½, 91⅞, 92, 3½ p.ct. maximum 63¾, 4 p.ct. preference 81¼, 3 p.ct. debenture 63, Imperial Continental 161, 162, 163, 163½, 164⅛, 164⅜, Montevideo 54, Primitiva 6s. 3d., South Metropolitan 99, 99½, 100, 3 p.ct. debenture 61, Swansea 7 p.ct. preference 104⅜. Supplementary prices, Barnet "A" 154, 154⅛, Uxbridge 4 p.ct. debenture 78, 78½.

On Tuesday, Brentford "A" 103½, British 4 p.ct. debenture 74 *ex* div., Commercial 3½ p.ct. 94, East Hull 89½, European 6⅜, Gas Light and Coke 91, 91½, 92, 3 p.ct. debenture 61½, Imperial Continental 164, Primitiva 6s., Southampton 86⅜. Supplementary prices, Bristol 4 p.ct. new debenture 77¼.

On Wednesday, Alliance and Dublin 64, Bahia Blanca 3s. 9d., 4s., Brentford "A" 103½, "B" 102, 103½, 5 p.ct. preference 91, British 117, Continental Union 7 p.ct. preference 77½, European 7$\frac{1}{16}$, 7¼, Gas Light and Coke 91, 91½, 91⅜, 91⅞, 92, 4 p.ct. preference 80⅜, 81, Imperial Continental 162½, 165, Primitiva 5s. 6d., 6s., 6s. 4½d., South Metropolitan 99, Tottenham "B" 101, Wandsworth, Epsom 5 p.ct., 118½. Supplementary prices, Bahia-Blanca "B" 5d., 5½d., Croydon 7⅛ p.ct. preference 104.

On Thursday, Alliance and Dublin 64$\frac{7}{16}$, 64½, Bombay 5$\frac{7}{16}$, Brentford "B" 100½ *ex* div., Bristol 90½, Continental Union 27, European 7$\frac{1}{16}$, 7$\frac{3}{16}$, 7$\frac{1}{4}$, 7$\frac{5}{16}$, Gas Light and Coke 91, 91½, 91⅜, 92, 4 p.ct. preference 81½, 81¾, Imperial Continental 163, 164, 165, 166, Liverpool 7 p.ct. preference 105⅜, Montevideo 55, South Metropolitan 99⅛, 99⅜, Southampton 87, Swansea 6½ p.ct. debenture 103½, 105, Tottenham "B" 101⅜, 4 p.ct. debenture 79½, Tuscan 6 p.ct. debenture 70. Supplementary prices, Croydon 7⅛ p.ct. preference 105, Hornsey "A" 188, Romford 4½ p.ct. debentures 88, 88½.

On Friday, Aldershot "C" 82, Brentford "B" 100, 102, *ex* div., British 117. 4 p.ct. debenture 73, European 7⅜, 7$\frac{7}{16}$, 7$\frac{1}{2}$, 7$\frac{9}{16}$, 7$\frac{5}{8}$, Gas Light and Coke 91½, 91⅜, 92, 92½, 3½ p.ct. maximum 64½, 4 p.ct. preference 81, 81½, 3 p.ct debenture 62, Imperial Continental 164½, 165, 165½, 166, Montevideo 56, Plymouth and Stonehouse 112, Primitiva 5s. 7½d., 5s. 9d., 6s., 4 p.ct. debenture 56½, South Metropolitan 99, 99⅜, 100, Wandsworth Wimbledon stock 112. Supplementary prices, Danish 4 p.ct. debenture 72½, Gas Light and Coke 10 p.ct. bonds 190, Uxbridge 4 p.ct. debenture 74.

In Lombard Street on Friday comfortable conditions prevailed. There was at no time any pressure for loans, which were offered at 2½ down to 2 p.ct., and in some instances as low as 1½ p.ct. There was again a material rise in the average rate at which Treasury Bills were allotted, and compared with a month ago there has been a rise of over 11s. 2d. p.ct.

In the Foreign Exchange market the value of sterling in New York continued to improve, although French francs remained weak. Milreis were depressed on the accounts of the revolutionary movements in Brazil. At the close of business on Friday the dollar-sterling was quoted at 4.35⅝, French francs 85.45, Belgian francs 96$\frac{7}{16}$, and Italian lire 102$\frac{3}{16}$.

The price of silver was steady. China was selling, but Continental support was in evidence, and the closing quotation was 34$\frac{9}{16}$d. per oz., $\frac{1}{16}$d. above the previous week's price.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5, 1923. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2½ p.ct. at notice.